

Master en Teoría y Práctica del Proyecto Arquitectónico

Análisis de los refugios de montañismo y “cabañas de weekend” de Charlotte Perriand

Estudiante: GEORGIA NTELMEKOURA

Profesores: Josep Quetglas, Victor Brosa
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Master on Theory and Practice of Architectural Design

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“May we never lose from our sight the image of the little hut”

-Marc-Antoine Laugier, “*Essai sur l’Architecture*”-

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1.Preface

This essay was conceived in conversation with my professors. Having studied already the typology of my country's mountain shelters and a part of the ones that exist in Europe, I welcomed wholeheartedly the idea of studying, in depth, the case of *Charlotte Perriand*. As my investigation kept going on the more I was left surprised to discover the love through which this woman had produced these specific examples of architecture in nature.

One that walks and spends time on the mountains and nature can tell her intentions and decisions. Mountaineers and grub-hunters share an ideology that respects and accepts the rules of nature. This is exactly what Ch.P. did. She accepted the facts of every environment, in order to propose an artificial dwelling for the "modern man".

Ch.P was one of the role-models of the 20th century for the modern women. She chose to walk against the stream of the conventions of her era. Free-minded, creative and insurgent she dared to propose the new way of leaving. She was an avid sportswoman, and an inveterate traveler searching for the "truth" of every culture.

She produced these examples that I am going to analyze, while she was working in the atelier of *Le Corbusier* and *Pierre Jeanneret (1927-1937¹)*. Working with them is something that someone can detect not only by the way she organizes and presents her drawings (she keeps a similar way of encoding her sketches like the drawings of LeCorbu., and in some of them she even uses the same type of letters to explain the spaces of the huts), but also in the way she uses the model of man in her ideas². Having spent many of her childhood's summers in the mountains with her grandfathers, she kept a certain intimacy for these spaces (the mountain huts) and she preferred to present her propositions by images³ and photomontages⁴ of herself. In almost all of her drawings she included one model(human) in order to show the scale of the things.

Living in nature, with the almost basic stuff, away from the commodities of the "civilized cities", is a completely different experience. The space and the things that includes take a new meaning. This new meaning is something that derives not only from the "Esprit Nouveau", that Ch.P, Le Corbu and P.J. promoted, but also by the rules that mountaineering

¹ She worked in even bigger scale and permanent projects in the mountains such as the design of the interior of the existing chalet Le Vieux Matelot of the Crêt des Neiges Hotel (1938), the competition of Vallee des Belleville (1962), the complex of les Arc 1600, Arc1800, Arc2000 (1967-87) in Savoye and her own chalet in Méribel-les-Allues (1978). Apart from the chalet Le Vieux Matelot, all of the others project she conceived and produced them after her come back from Japan. Having separated her way from the atelier Le Corbusier-Pierre Jeanneret, she went to Japan as a consultant of Industrial Design to the Department of Trade Promotion of the Japanese embassy in Paris, under the auspices of the Imperial Ministry of Commerce and Industry(1940). Her turn versus a more massive advent in the mountain is evident. Moreover the influence of her staying in Japan derives from the characteristic interiors she proposes.

² she draws some of the following example with P.J. who as a skilful engineer and practical mind is a great influence to her.

³ the following "bivouac shelter"

⁴ the following "barrel shelter"

and leisure activities follow. These new dwellings had to serve the fundamental needs of human, in order to be as much Spartan and natural in their built environment. In this way the man would easily reconcile with nature and relax away from the noise of the industrialized cities. These projects evoke the calm, simplicity and rusticity providing simple accommodation of the most modest means. Ch.P. created these small low-cost spaces because she loved the life near the isolated nature and wanted to share this experience.

Much has already been said by her love towards the wood and its use in many parts of her furniture. This preference applies in these cases too, as the need for a light, cheap, glaze and insulating material is compulsory. Many of these projects are made of wood or have wooden parts, not to mention their wooden furniture. Even more Ch.P. experiments with metal stools, panels of aluminum metal cables and rocks, trying to find the most suitable solution for every different case. In this way she approaches every case with a different manner, repeating good ideas that had already proved to be useful. This is a procedure that has set the foundations of contemporary prefabrication. Ch.P. was one of the firsts to propose full production of a dwelling inside the industries. She explained all the details of the consisting parts and how they were to be transported to the site of their assemblage. This was one of her most innovative proposals.

In this investigation, I present the following shelters by priority of their date. After analyzing their basic form and structure one could say that there is an evolutionary sequence in these cases, in a way that the last ones are being the results of the prior ones. This evolution has to do not only with the appliance of better materials but also with better structures.

The method of analyzing these examples had to be graphic due to lack of well explaining information. By this way I attempt to fill in this gap, by understanding and decoding the ideas behind these sketches. I redesigned and translated all of them, adding in some of them basic plans that they were missing. In the cases of the ones that we have built proof I consulted some of their images in order to confirm them. In the last chapter I studied the tendency of the first half of the 20th century towards the minimum dwellings, and tried to compare some of it's data (openings, indoor conditions, materials, skeleton parts, furniture, beds) with the characteristics of Ch.P. shelters. In those times, the whole world was trying to redefine the proportions and the conditions of the "new living". This is something that exists also in Ch.P.'s shelter, nonetheless in a greater and more innovative extent.

1.1 Prior mountain shelters in Europe

When Ch.P. began designing these dwellings for human's leisure time, was actually expanding a general stream towards life in nature. This was the "fuel" for her generation to demand vacations outside the urban environment. A culture of vast tourism, affordable by the majority of the

middle class was born. As we have stated earlier Ch.P. spent most of the summers of her childhood in the mountains. She was a skilful mountaineer and a skier. Her country has the opportunity to include one of the most important part of the European mountain chains; the Alps. It was in these mountains where, the whole mountain tourism began. Apart from the fact there have been known prior, individual attempts, considered as official mountain expeditions⁵, the foundations of the so called alpine tourism were set in the region of France. At the beginning the mountain refuge had the meaning of a shelter that was used by the sheppards of the high Alps, who were traveling along with their herds in the mountain chain. These primitive dwellings were low, made by the simple placement of rocks (a material that is easily found in the high altitude), creating a kind of vault or a natural cavity that resembled to a cavern. One of the first mountain huts Horlihutte [Ima.2] in Switzerland, expresses frankly the identity of these constructions.

The French investigation, over the mountain shelters during the 19th century, elevated the global knowledge of the behavior of such dwellings, in high altitudes and ended with the construction of several dwellings in the vast mountain chain of the Alps. From [Ima.1] we can see the large number of the mountain shelter around Chamonix. In general the typology and their constructive methods evolve along with the number of the mountaineers who walk on the mountains, the use of new mechanical methods to carry the constructive materials and finally along with the newer strategies of protecting the environment.

Since 1875 a well organized movement to equip the mountain chain of the Alps, sets the program of these prototypes. The first shelters should be a shed of 4x7 m² surface, containing two areas. On the one side there should be the sleeping area with the beds and on the other side a table and a bank to sit. This "Spartan question" set the basis for the latter development of the mountaineering in Europe.

Following this prototype, there have been applied four different constructive methods. Every one had it's pros and cons, that worked at times beneficially or harmfully depended on the placement of their site.

- 1) wooden constructions similar to the shed of the sheppards of the high mountains. [Ima.2]
- 2) a shed, with a roof made with plates of rock.[Ima.3]

⁵ By the Japanese En no Shokaku, when in 633a.C. he set foot on the peak of mountain Fuji (3.776 m.). Later the Swiss grub-hunter, Conrad Gessner (1516 -1565) traveled around the Alps in order to collect information concerning the vegetation of the high-mountain area. Yet the most important achievement in the history of mountaineering has been the climbing of the highest peak of the Alps in 1786 , that of Mont Blanc, by the French doctor Michel Gabriel Paccard and his guide Jacques Balmat.

- 3) known as the method of the Pyrenees; vaults made of rock left uncovered; small apses that combine the idea of the sheppard's shed with the one of a fortress.[Ima.4,6]
- 4) A construction dug and submerged in the earth. Cavities artificially dug , trying to achieve the maximum protection, from the exterior intensive phenomenons.

However the last three types, failed to produce a well protected and living space. They were left damp due to the flowing of water on their walling creating unhealthy conditions. This is why the constructive methods returned once more to the prior application of the wood. Yet this time the new era demanded the prior prefabrication in the workshops of the industry, and the latter articulation of the whole in situ. This was the beginning of a wide spread method that was also proposed by CH.P. as we are going to see at the following chapters. The wooden parts at the beginning were carried through mules and animals at every site. Later it was the helicopter that was called to accelerate the procedures.

Yet mountaineers never stopped experimenting with new materials. With the expansion of the modern industries the idea of panels⁶ that were to be made of plywood (interior surface), insulating fabric (intermediate surface) and metal sheet (exterior surface)[Ima5,6,8-10], came to establish the new era in these constructions and most of all the philosophy of the combination of materials.

The economic crisis, the absence of many good industrial materials after World War II, and the extreme weather conditions, dictated a combination of a variety of materials that were going to collaborate in order to produce the best habitable conditions. Yet later during the second half of the 20th century technology enriched these constructions with newer kind of panels, made of advanced plastic materials [Ima.]. This converted the so called image of "causy shelters", in sophisticated constructions that resembled to spaceships. This turn out should not surprise us , as we are going to see that through CH.P.'s sketches that these ideas were being prepared during the very beginning of the 20th Century, but were left undeveloped due to lack of technological knowledge and economic reasons.

⁶ CH.P. also proposed similar kind of panels



[Ima.1]



[Ima.2 shelter Horlihutte – Switzerland, 1868]



[Ima.3 shelter Bayssellance French Pyrenees , 1889]



[Ima. 4 shelter Packe, French Pyrenees,1896]



[Ima.5 shelter Fondturbat,1925-1940]



[Ima.6 Selle,France,1980's]



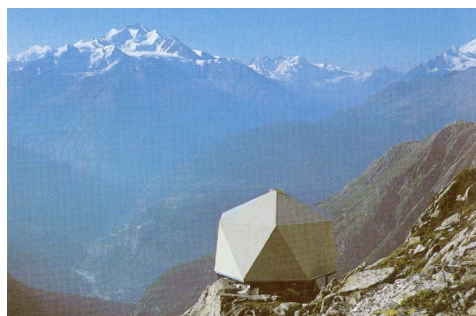
[Ima.7 shelter Gino Rainetto, Italy, 1963]



[Ima.8 bivouac shelter Aiguillette a la ingla, Switzerland,1980's]



[Ima.9 shelter Misabeljoch, Switzerland,1980's]



[Ima.10 bivouac Stockhorn, Switzerland,1990's]

2.Presentation-Primary analysis

2.1 Weekend hut - Maison au bord de l' eau

(L'architecture d'aujourd' hui competition, 1935)

In February 1934 Ch.P. returned from a visit in the U.S.S.R. Her newfound political beliefs towards the communism were evident not only in her writings but also in her projects. She strived for the mass production of low cost objects and dwellings so as to be more affordable to middle class families. Apart from her personal beliefs, many social changes lead the government of France to reduce the working hours to 40h/week and even more to pay for a period of vacations for every family.

An immense wave of people who were seeking relaxation outside the cities collapsed [Ima.11]. The leading French professional magazine "L' Architecture d'aujourd'hui" organized some competitions under the general theme of "la Maison du weekend". CH.P. participated with this project on the second annual competition which called for a small weekend house on an unspecified riverbank accommodating a family of five and two guests. She received an honorable mention for her idea and her version of "la Maison au bord de l' eau" was published with her article in the same issue of "L' Architecture d'aujourd'hui", under the title "The Family dwelling"

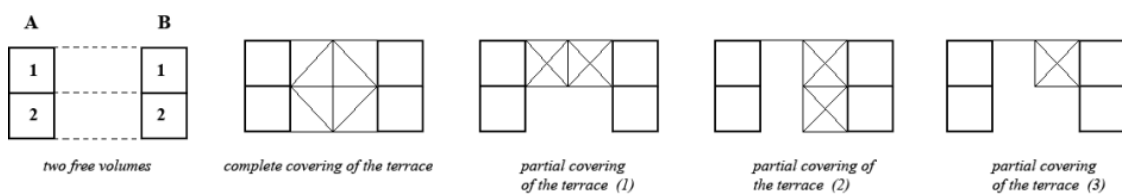
Her concept consisted of two equal parallel sheds (volume A and B), placed on a wooden platform raised over the level of the riverbank. The whole structure was set on stone piers so as to keep a certain distance from the water of the river and achieve a healthy and livable construction without unpleasant interference. Like she has stated in the competition's texts she intended to create " a wooden tent, free to the ingenuity of it's tenants, without further internal development". Shed A was to host the family and shed B the guests and the kitchen. Nevertheless the key-role to this construction was the space of the platform between the two sheds. This place was to become the main living area of the house for eating and outdoors relaxation. With a whole in-wall barbecue set at the back and the lateral walls of the sheds pivoting up and down, protecting the "deck" from the sun and the rain, it is easy to see her deeper intentions.

[Ima.12] explains the mobility of every panel and the optional setting of the hut according to it's tenants willing. Prolonged wooden panels, rise and close so as to cover completely or partially the outdoor space between the two sheds.

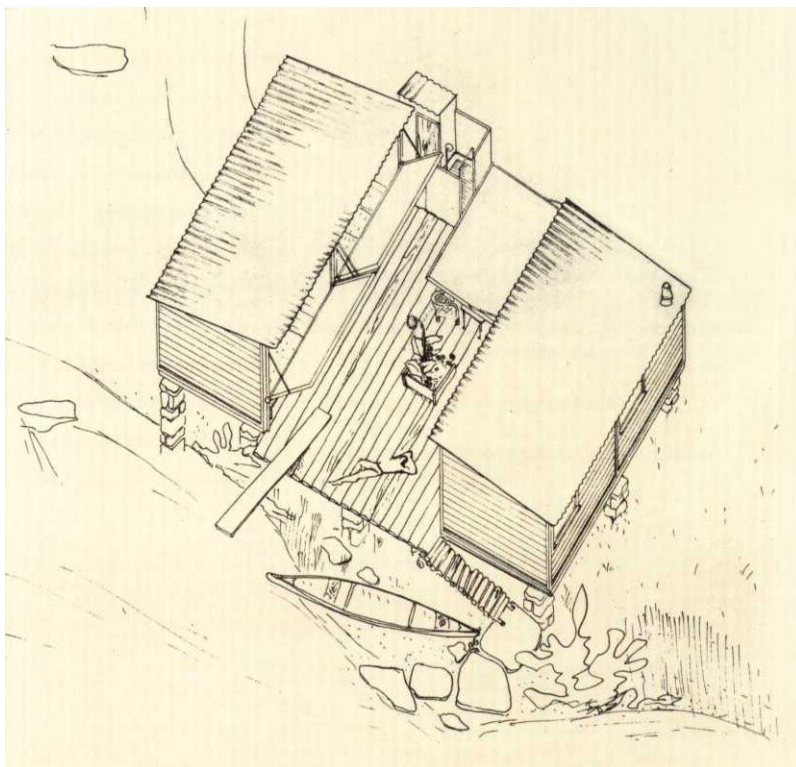
This axonometric sketch [Ima.13] contains the spirit of her idea. The chimney of a stove, the trails of a vehicle sliding down the structure, the sloping wooden stairs, the diving board and the W.C. at the back of the hut A, show that her study on this project was trying to provide every possible commodity through simple and low cost methods.



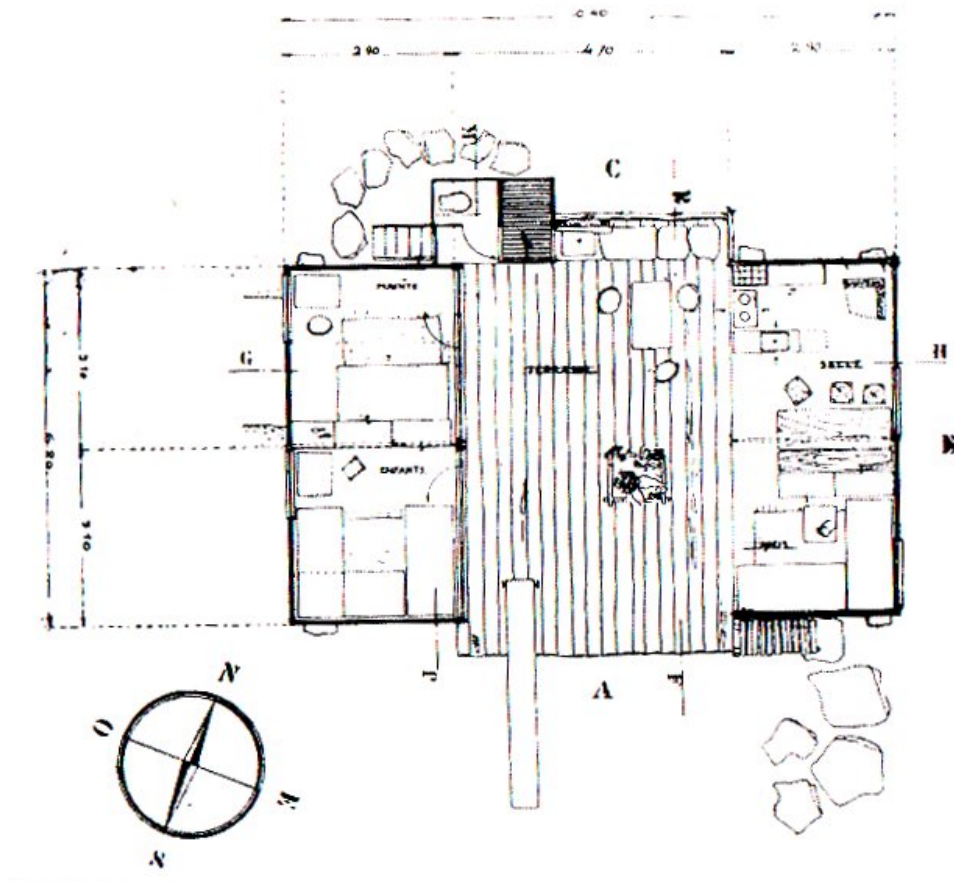
[Ima. 11]



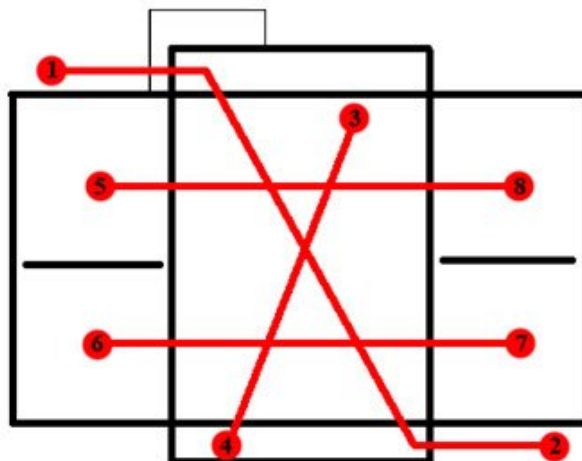
[Ima. 12]



[Ima.13]



[Ima.14]



1 stairs A (entering) 2 stairs B (towards the river) 3 dining-living room 4 diving platform
5 sleeping room - parents 6 sleeping room-children 7 sleeping room-guests 8 kitchen

[Ima.15, produced by the author]

Non the less we have to examine more plans of this proposal(main plan and sections), in order to capture the key solutions of this project and detect it's data.

By the ground plan ,[Ima.14], we get many information concerning the circulation of the hut and the furnishing of every room.

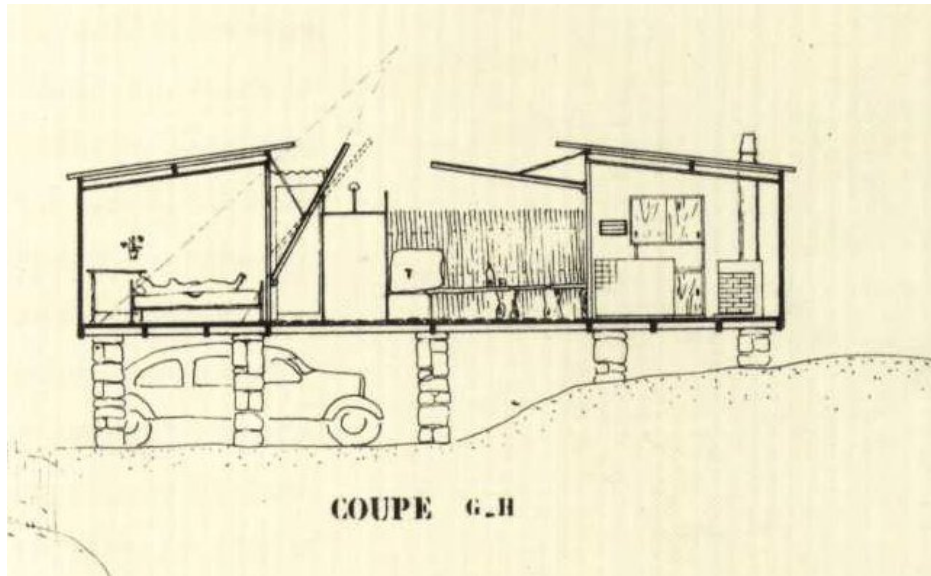
To begin with we note the orientation of the whole structure regarding the N. She places the sleeping rooms behind the kitchen (in shed B) and behind the W.C. and the barbecue (in shed A), so as to be protected by the strong cold northern winds. Secondly by analyzing the plan we decode the section of two perpendiculars that organize the life of this house around of their section.

It is very characteristic the above diagram [Ima.15] explaining the axis of movement and visual connection. We note the diagonal opposite placement of the two stairs (A and B), which represent the entrance(from the garage beneath) and exit (towards the river) to the hut. The "equilibrium" on the deck is maintained by the second diagonal axes of the dining-living room (3) and the diving platform(4). Non the less the role of the interval wooden deck is upgraded even more by the other two "visual" axis of the parent's bedroom(5) towards the kitchen(8) and the children's bedroom(6) towards the guests' room(7).

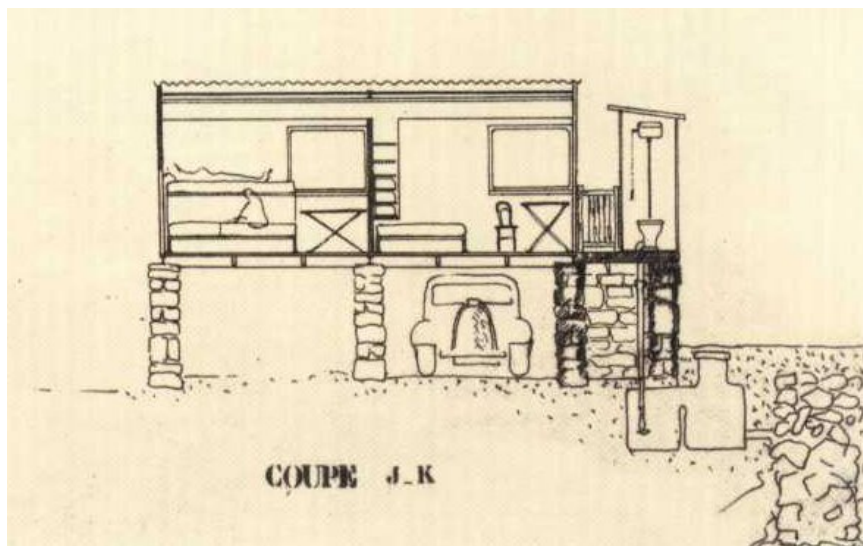
Accordingly [Ima.17], we also see the strange isolation of the rooms of every shed from each other. Going further we find that only the moving panels of shed A have two small doors while the kitchen and the guests' room don't. Both of these decisions are happening on purpose in order to force the tenants to get out from their covered shelter and enjoy their "open space" (the platform) outdoors.

Studying the main section G-H, [Ima.16], of the Weekend hut, we get many information about the panels , the furnishing and the role model of living that Ch.P. was trying to introduce to this competition. It is remarkable her indirect answer to the question of the inclination of certain terrains in nature. She presents her proposal over a slope, showing that her project could be applicable to every possible site considering that the main structure is set in a certain distance from the earth. On the other hand she takes advantage of this characteristic of nature in order to place the garage under the hut. This is a decision that reveals clearly of LeCorcu's influence. Just like in Villa Savoye, Villa and many other project of Le Corbu the car has it's own distinctive role in the house. The "modern family" is the one that uses the car as it's main way of transportation and Ch.P. makes clear that just like in every other normal residence, even here the car is going to find it's own place.

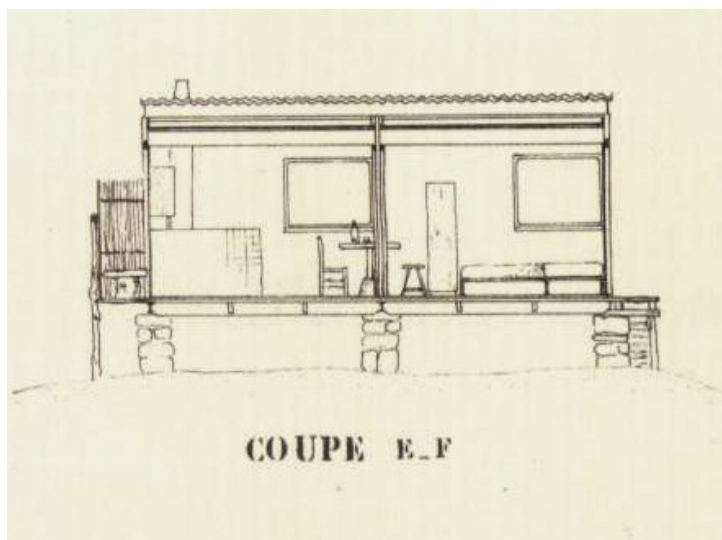
In this section [Ima.16] the moving panels are explaining their use. In the morning they provide the inner spaces with light, in the evening they shade the central platform protecting the tenants form the rising temperature, while at night their inclination provokes the ventilation and



[Ima.16]



[Ima.17]



[Ima.18]

cooling of the dormitories. The material of the roofs of both sheds is not easy to understand, I would say that it is sheet metal. These surfaces keep a certain inclination towards outside, in order to keep the water of the rain flowing away from the hut. On the right side of the section we see the stove, it's chimney and some of the cupboards of the kitchen. On the opposite side we note some of the parent's bedroom furniture. In both rooms, the placement of the elements-furniture is such that facilitates the interaction with the outdoors space of the central platform.

In the following section J-K, [Ima.17] we see the setting of the W.C. of the hut. For Ch.P. the W.C. and the supply of fresh running water were one of the advantages of this 'built tent'. Not only because this was even more difficult being in nature away from the basic infrastructure of the city, but even more because she wanted to prove that this project was able to propose more than anything a hygienic solution. It is remarkable the detail of the cesspool and the rock structure under the W.C. Moving a little bit by the side watching the face of the car, we surprisingly compare the heights of the space beneath and the rooms of the hut. This is a secondary area, that serves only for storage(the car, any plywood for the stove). This section is also valuable to us because it shows the height of the wall between the two bedrooms. Up until now we had in mind that the intermediate wooden walls were completely separating the dormitories. We need not rush up into conclusions because the following section of the shed B, differentiate this detail between the two sheds.

The section E-F [Ima.18] makes clear that the dormitory of the guest does not communicate not even acoustically with the kitchen. This is happening because a guests' room demands a certain privacy and isolation and moreover because the kitchen usually is a very noisy area. Likewise the above drawings Ch.P. presents every detail of the furnishing in order to explain as clear as possible the commodities of this proposal.

According to her this project introduced a weekend hut that combined an atelier, a garage and a cave. This was a low cost structure of metal ceiling panels, wooden panels for indoor and outdoor walls and of a metal structure. It could be easily erected and demolished in few hours and it could be expanded if the program of the family demanded so.

2.2. The Tritrianon shelter- Maison de l'agriculteur

(L'architecture d'aujourd' hui competition, 1936-37)

The Tritrianon hut was Ch.P.'s and Pierre Jeanneret's new project for the competition of 1937, of "*L'architecture d'aujourd'hui*". Regardless of the fact that she is presented as the sole creator of three participations⁷ in the

⁷ Apart from the "*la maison au bord de l'eau*" and "*la maison de l'agriculture*", Ch.P. participated with a third proposal of a much larger wooden hut, that promoted communal

competitions of this important magazine the truth is that P.J. helped her solve many constructive details in all of these cases. In the Tritonian project Ch.P. worked on a hut that would later be the object of experimentation by P.J. for hypothetical expanding versions. These huts were intended to apply to families of “weekend-farmers” that would keep next to their dwellings small gardens enjoying the field crops.

The concept consists on the minimum hut that is formed based on the proportions of the beds of the shelter. The more tenants every hut has to host the more huts are put the one next to other in order to enlarge the living area. This specific example consists of two units, a sleeping area and a space of “services”.

I began analyzing designs⁸ of two sections [Ima.19-20] and three lateral views [Ima.21-23] realizing that the whole project lacked of a certain ground plan⁹. As in the previous project, here once more Ch.P. produced designs that contained every little furniture that would give to the dwelling a proportional and functional explanation. I began decoding the sections and the elevations of the hut, trying to make out of them the “missing’ ground plan and attempting to realize the method that she used.

At the beginning I didn’t miss to pay attention to certain elements of the previous project that were repeated here, once again. For example the elevated structure that stands in a distance over the ground, the inclined roof (in order to move away the waters of the rain) made of metal sheeting, the lateral projecting beams that create seating area and the mantled and dismantled surfaces of the walling. On the contrary other constructive elements such as the foundation of the hut had changed. The columns and walling up of rocks have given their place to four concrete foundations that support the whole structure. This is due to the size of every project¹⁰.

Even more from the details of the section [Ima.19] I noted how the covering (of an unknown material) over the inclined roof beams, is trying to protect them from weather. Jumping from the sections to the facades [Ima.21-23] I understood how through the showing up of some trees, she proposes the placement of this structure in an hypothetical rural environment. It is characteristic how she is trying to presents this environment in the cornices of the windows and the semi-opened at the sections (as if she was trying to put the trees into the hut). She doesn’t miss once more to use the model of man and outdoor furniture, in order to complete her concept of outdoor living and explain the scale of the hut.

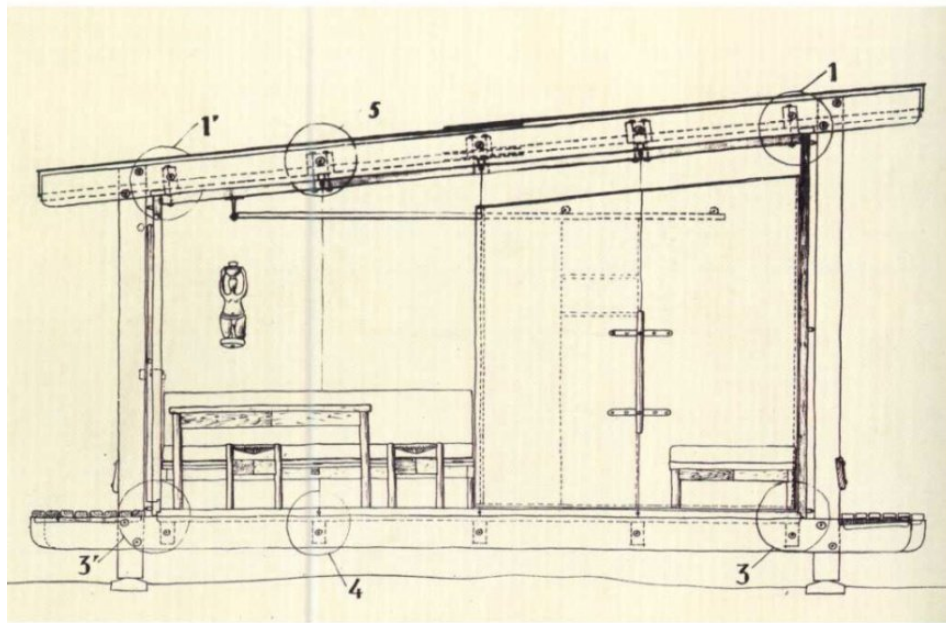
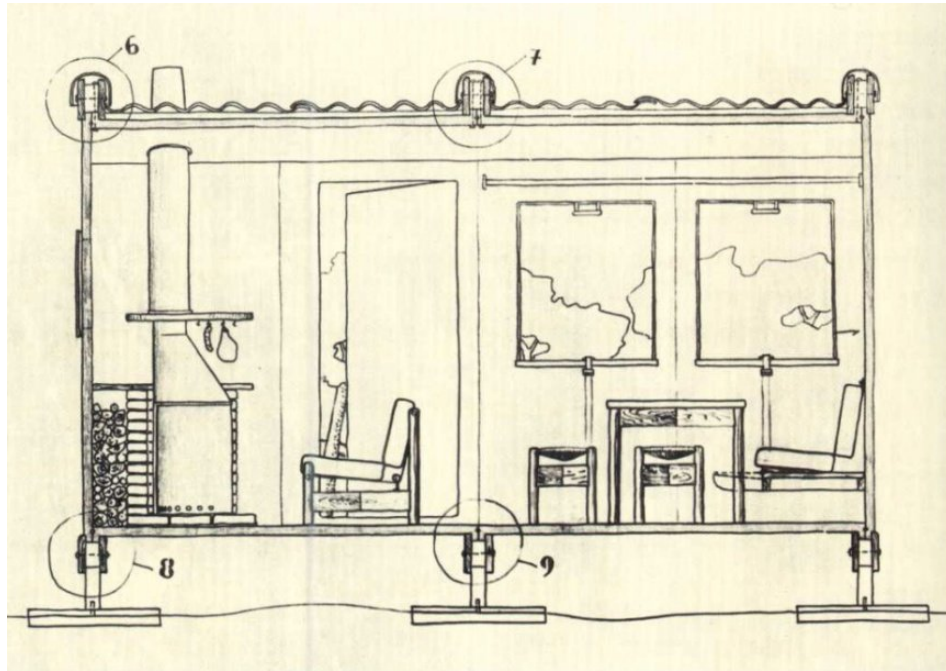
living around a large mezzanine where an orchestra was hosted in order to entertain the tenants.

⁸ Mary McLeod, Charlotte Perriand: an art of living, Harry N. Abrahms, New York 2003

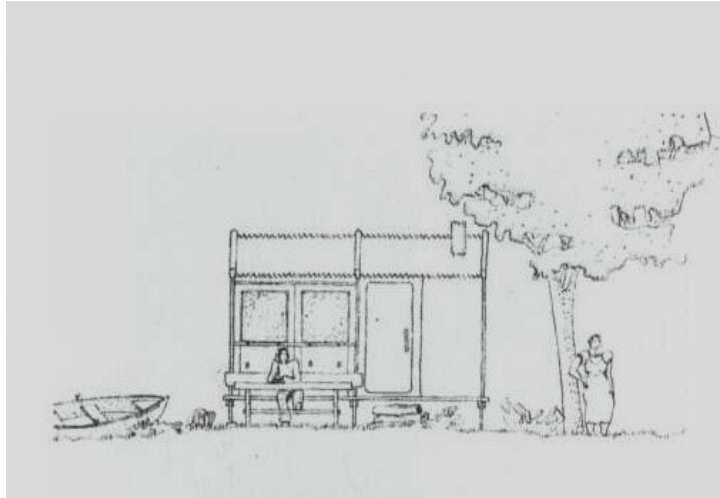
⁹ The misunderstood was later solved due to several ground plans that are attributed to J.P. As it seems, Ch.P. collaborated with J.P. in adopting certain axis of composition, leaving her to work with the basic unit of (3persons) and him to experiment with the possible expansions of bigger families. This is why the ground plans seem to have been done by P.J. while she is given the intellectual rights of these sections and elevations.

¹⁰ “*la maison au bord de l’eau*” is a larger and more complicated structure that demands a more solid and strong foundation. Not to mention the concept of the cave under the shed, that CH.P. proposed as a more natural shelter.

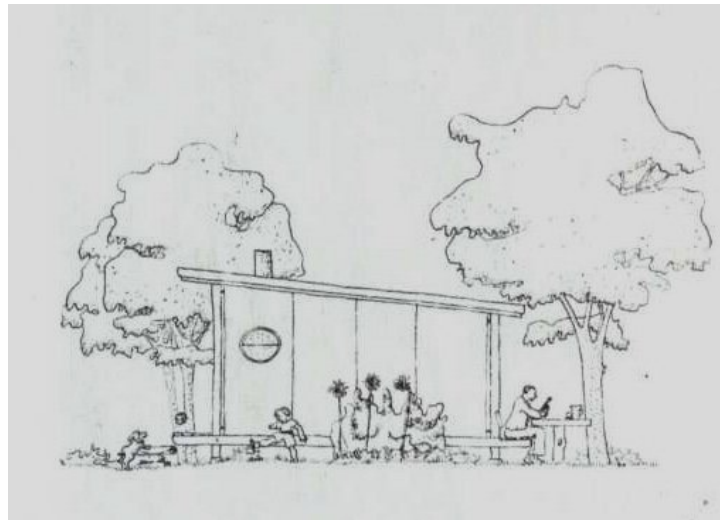
[Ima.19]



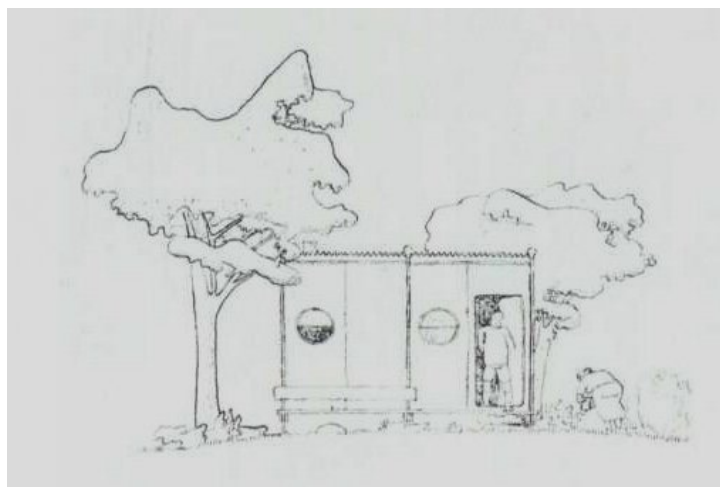
[Ima.20]



[Ima.21]

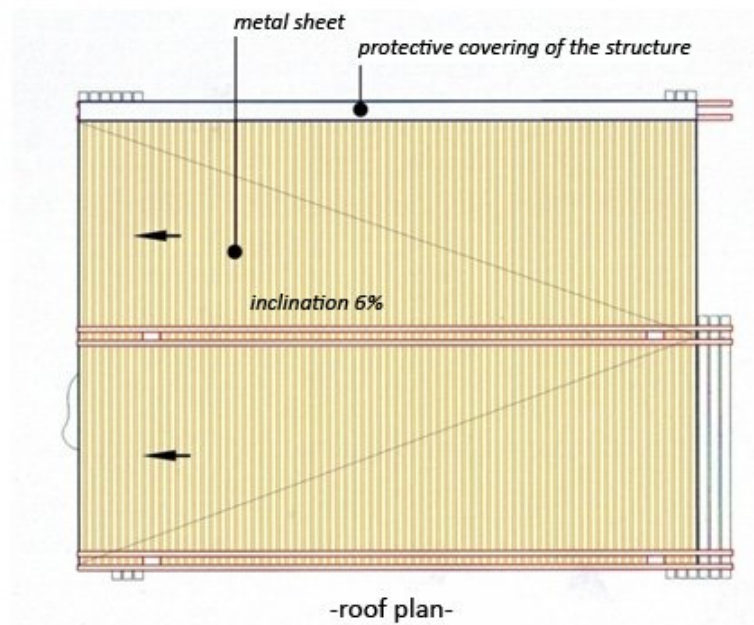


[Ima.22]



[Ima.23]

[Ima.24, produced by the author]



1 bed-sleeping area 2 W.C. 3 kitchen 4 cupboards - closets
5 dining-room

[Ima.25, produced by the author]

Seizing the opportunity to design the ground plan [Ima.25] I came up with certain details that I would like to point out so as to mark her composing tendencies. In this project she presents the wooden structural columns outside from the “box” of the shed. This gives her liberty to organize in an easier way the interior space and gain more room. From the perspective opening of the doors at the facades and the model of man I got their placement¹¹ and their opening. This was a good start, because from there on I managed to copy the spots of the perpendicular and round windows and the furniture of the sleeping and dining area. I even got to copy the lines of the panels of the walling. The “assumption” seemed to be developing quite well, until my analysis reached the point of the sliding wall of the main section. From the free hanging metal driver, extending from the one side towards the other, it is clear that the intermediate panel between the two units is sliding. This assumption was verified by the following sketch that shows that the trapezoid form of the intermediate panel matches exactly at the inclination of the lower part of the roof [Ima.26].

This commentary led me to some another question. *What is hiding behind the sliding intermediate panel when it is set at an extended place separating the one unit from the other (it is clear that from the existing drawings we don't understand the program of the hut behind the sliding panel)?* At this point, the red-marked area in the ground plan was a riddle to me. I knew that Ch.P. had to include to the shed a kind of kitchen. More over watching the exterior space described from the facades I noticed the lack of a W.C. From the back façade [Ima.23], that shows the backdoor of the hut, I assumed that behind this door there should be a kind of movement or even a corridor. My assumptions came to be verified when after a continuous investigation I run into a series of the ground plan that P.J. had produced [Ima.27] as a adjoining study of possible expansions of this hut. These plans included not only the same example of the hut for 3 person, but also the minor unit for two and larger units for 6 person and even more guests¹².

The whole graphic character of the drawing is really close to the one of the drawings of the previous competition, something that shows us that P.J. should have been a fundamental help to her, to the previous participation as well. The appearance of these drawings¹³ (they were found in the French translated version of the book of Mary McLeod, *Charlotte Perriand: an art of living*, Harry N. Abrahms, New York 2003) gave many answers to my questions. First of all, as far as the prototype of the three-bed hut is concerned, I got to understand the specific location and dimensions of the kitchen and the W.C.¹⁴. Secondly I realized that every equal unit that

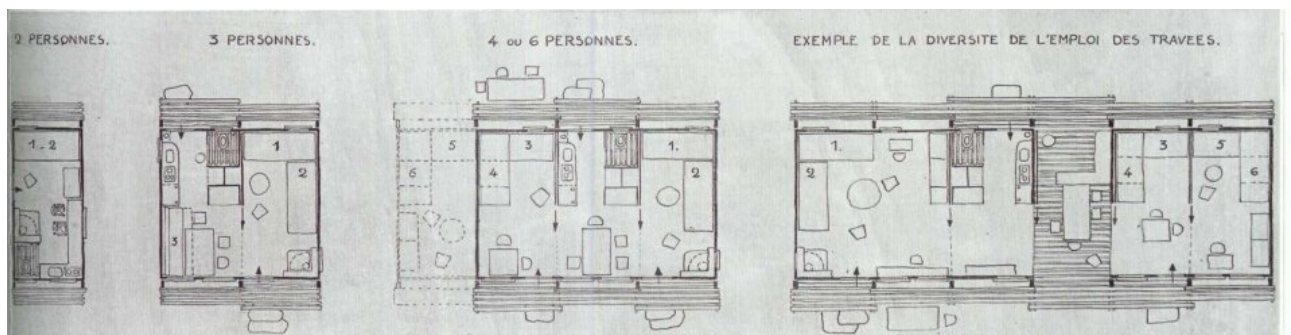
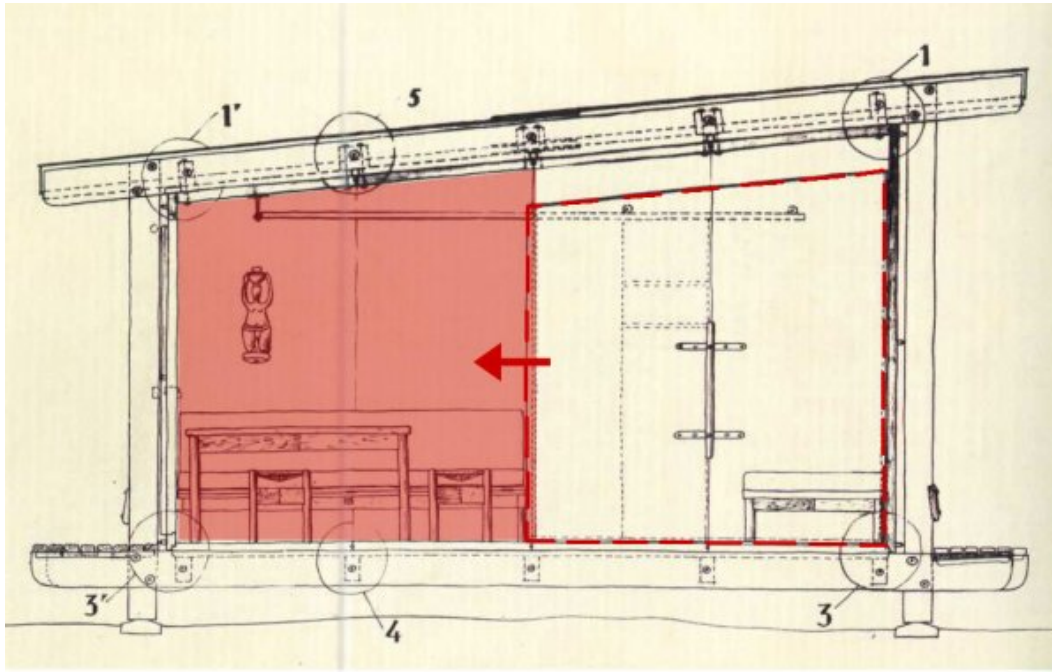
¹¹ Here the doors are placed in an almost opposite diagonal spots, just like the stairs in “*la maison au bord de l'eau*”.

¹² In this particular example is used, once more (like in “*la maison au bord de l'eau*”) the idea of the intermediate wooden platform as a uniting social space of the whole complex.

¹³ Barsac Jacques, Charlotte Perriand: un art d'habiter 1903-1959, Norma, Paris 2005

¹⁴ This way I got to redesign the red-shadowed surface of the ground plan

[Ima.26, produced by the author]



[Ima.27]

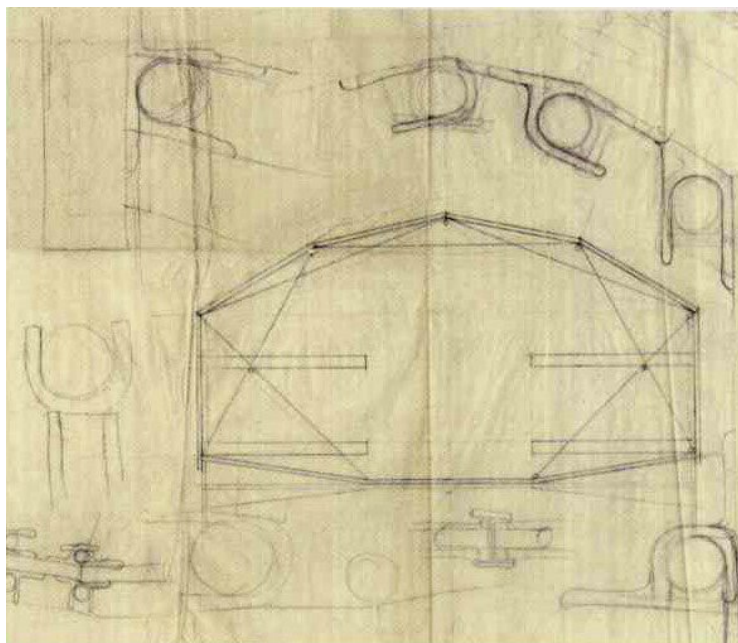
completed this hut could easily work alone as well. The above drawings of P.J. show how based on the length of the beds a sole unit can stand alone as a hut of two people or can easily be joined by other similar units enlarging the living area. In the case of the 4-6 persons' hut we note how the kitchen and the dining area chimes in the two units of the sleeping areas. Once again it is obvious how the kitchen's cupboards with the length of the W.C. and the corridor between them fit in the same dimension as the beds of the lateral units.

This series of drawings is a renewed version of the previous idea. Though the site of the theme was different, the goal was similar. A low-cost prefabricated structure that could host a middle class family. Ch.P. kept on evolving her ideas by adopting and abstracting elements that could serve better to the masses. Though her concept had to do with fixed units of specific dimensions (based on the dimension of the beds of the tenants) she managed through intelligent tricks, such as the sliding panels and the opposite diagonal placement of the doors to create flexible spaces which could provide social life but isolation as well.

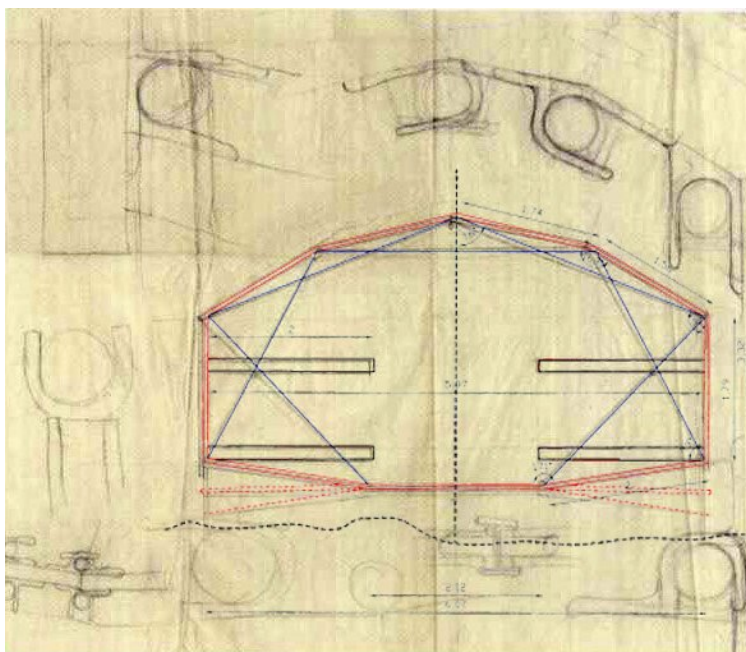
2.3 Cable shelter

The cable shelter is one of the first attempts of Ch.P. to produce a pure shelter of the high mountain. This is a project that like the two previous ones was never constructed. The only evidence of her idea is the following sketch of ink [Ima.28] where we can see the clear figure of a polygonal shell, containing two levels of beds. The lines that unite the acmes of the polygonal shape should be some sort of cables or ropes that help and keep the forces of the structure neutral. The drawing is obviously a section of a prefabricated shelter that is made of different parts. It is a symmetrical structure [Ima.29,30], relatively to its central axes, that uses the theory of the contrary forces in order to be kept united. The almost faded sketches over the scheme of the section show the way that every prefabricated part joins the other. This is the sketch of the proposed connections, a fact that makes us exclude from our hypothesis the idea of the tent made of an advanced textile. These joints are typical of solid surfaces.

Based on this conclusion we can tell that Ch.P. conceived another shelter of jointed panels. According to the poor information that I came across with, Ch.P. proposed a type of panels that have these characteristic cavities that block automatically. As long as the general scheme is a closed one, a new volume that contains space is created [Ima.30]. The cables -a significant detail of the structure- provide balance of forces that keep the whole, together. More over, through the useful consulting of P.J. she investigated the method of the synthesis of panels in order to use the weight of the snow so as to stick the panels together in a better way. At the lower part of the shelter on the left and the right side, we note the discontinuous lines of some kind of platforms opening towards a lower level. On the contrary



[Ima.28]



[Ima.29, produced by the author]

there is no sign of a supportive structure nor of a certain level of ground line. This clear closed shape, looks like a spaceship that is trying to land on earth.

Another important information of this particular case is the fact that Ch.P. uses once more the length of the beds in order to set the size of the whole shelter. Nevertheless this is the first time that she clearly states¹⁵ that the length of the beds is 2m. As we saw before and we are going to see later she got to develop proposals that could enlarge or shrink according to the capacity of sleeping places.

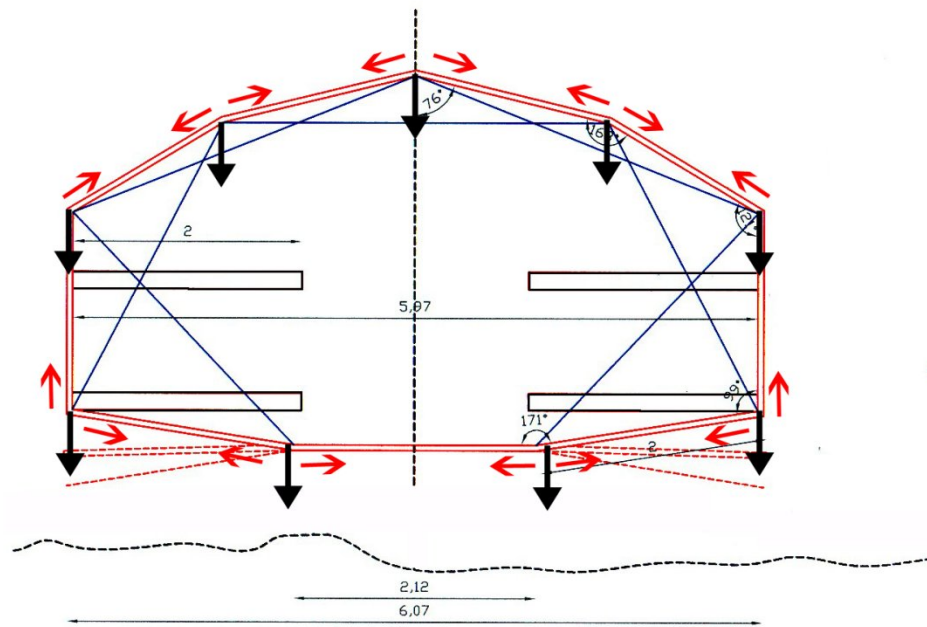
Trying to understand the 3dimensional shape of this project I created a possible 3d model [Ima.31] using only the following drawing of the section. Resembling to a diamond, this shelter can host 16-18 persons, without having any depositing, serving or hygienic facilities. We don't know for what purpose she worked on this project. It is an experimental effort to develop a prefabricated, low cost, easy and revolutionary structure that could be assembled in the high mountain. The absence of the basic serving facilities doesn't concern us as this must have been one of her primary drawing attempts that were kept closed to her drawers, and was later recalled and updated, as we are going to see later¹⁶.

Nevertheless I seize the opportunity to note once more, her tendency to create common, centric and social space organized around the hosting areas and by putting the doors¹⁷ and openings in opposite places. The new in this case is the absence of a structural skeleton not only of the main shelter but also of a supporting base underneath. However she introduces us the conceptual idea of the cables.

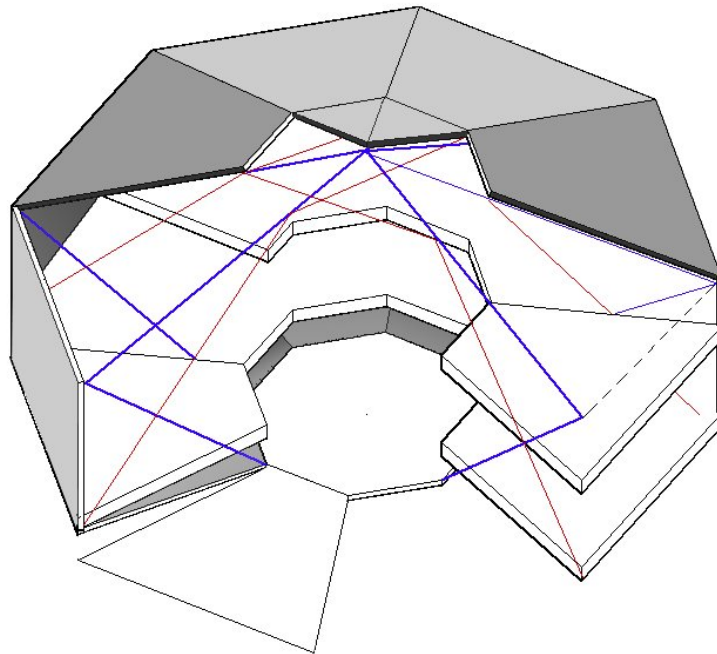
¹⁵ Barsac Jacques, Charlotte Perriand: un art d'habiter 1903-1959, Norma, Paris 2005

¹⁶ the following "*Tonneu shelter*"

¹⁷ Let us note here that the doors in this proposal appear as two moving platforms that lower down, in order to reach the ground.



[Ima.30, produced by the author]



[Ima.31, produced by the author]

2.4 Bivouac shelter

The bivouac shelter is a typical example of an “emergency” mountain hut¹⁸. More over, it was one of the few projects (of a whole building) of Ch.P. that was constructed. She designed it with the help of the engineer André Tournon and constructed it herself (with P.J ,André Tournon and one of his laborers) , in 1938, in 3 days. The site was in Mount Joly of Savoye (France) and the spot was at an altitude of 2.000m.

This is a structure that contains many of Ch.P. previous decisions in the cases of *“la maison de l’agriculture”*, and the *“cable shelter”*. The data that I was able to trace were two well designed drawings – a ground plan and a section- [Im.34] an some pictures [Im.32,33,37,38] during and after the constructive procedure. Combining the photographs and the drawings I saw that there have been some changes that had to do mostly with the supporting skeleton. Following the same analytic direction I redesigned the same plans with the new data this time, and more over I produced the missing plans of the four facades and the top plan. Touching this “treasure” I felt like I was walking in her boots’ snow traces. This has been a very fruitful exercise that enriched my knowledge over her hut projects.

To begin with I should say that just like she had planed it, this is a light construction that is made of 9 tubular poles¹⁹, 16 panel of aluminum, 4 concrete bases that serve as foundations and other wooden elements that are used in the interior equipment, all of them carried with horses and mules through the mountain trail.

From the section we can easily understand that this is a similar trapezoid volume²⁰ with the one of the *“la maison de l’agriculture”*, placed inside it’s supporting skeleton. We can even see the exterior projecting beam that turns into a sitting bench –ideal for watching the surroundings-.The dimensions²¹ described in the ground plan[Im.34] helped me understand precisely the proportion of things. The hut is a 4m.x2m. room which divides it’s program in two small units. A resting area (with some cupboards, a table and some stools) on the right of the entrance, and a sleeping area (with some articulated, sliding, wooden parts) on the left. Given the small of the room, all of the furnishing elements are well designed in order to change places, and create a more flexible interior space. The hut just like in the previous examples is made of articulated panels of walling that join one another with hidden cavities. Only that this time, the panels are made of aluminum and not of wood. Another innovation that Ch.P. introduced to this project is the ventilation system of two

¹⁸Ch.P. mentions this refuge as “bivouac” shelter. The word bivouac in the argo of the mountaineers is a technique of emergent sheltering outdoors. Nowadays it is accustomed that small constructions, with basic sheltering characteristics, placed in the higher zones of the mountains, to be named as bivouac shelters. Usually they are kept always open and free for someone to enter, containing some blankets and protected places of sleeping.

¹⁹ the supporting poles of the skeleton are less than the ones which are described in the first original plans.

²⁰ the term “trapezoid”, stems from the trapezoid shape of the section.

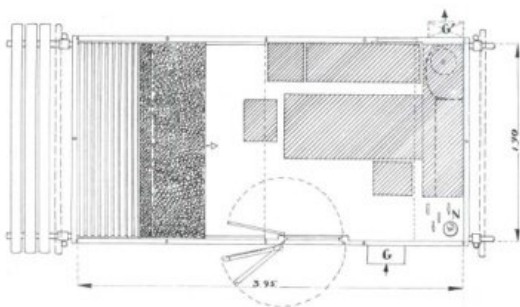
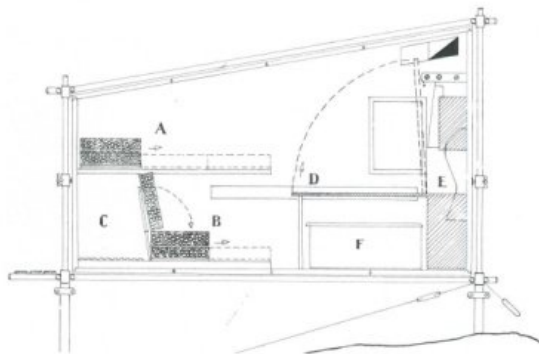
²¹ this is actually the first time that she shows the precise dimensions in her drawings.



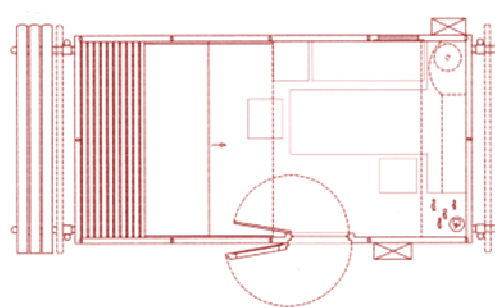
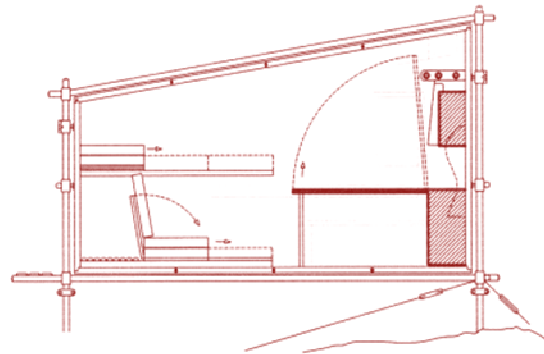
[Ima.32]



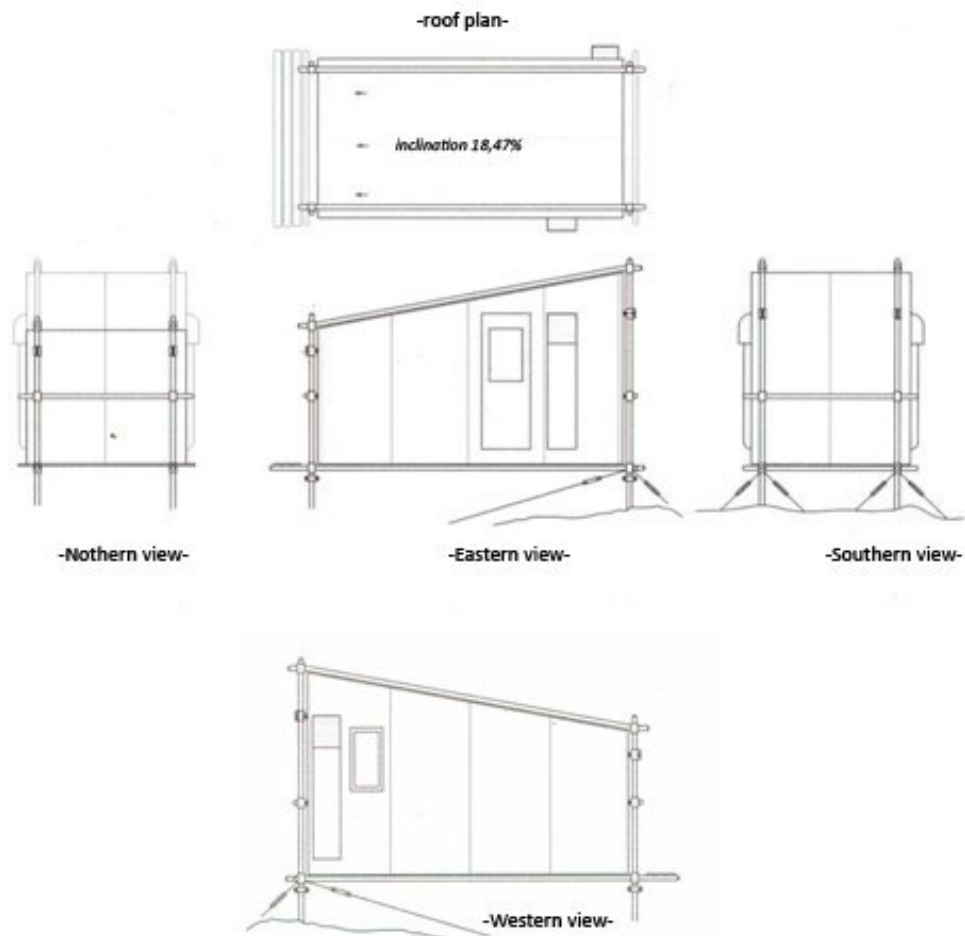
[Ima.33]



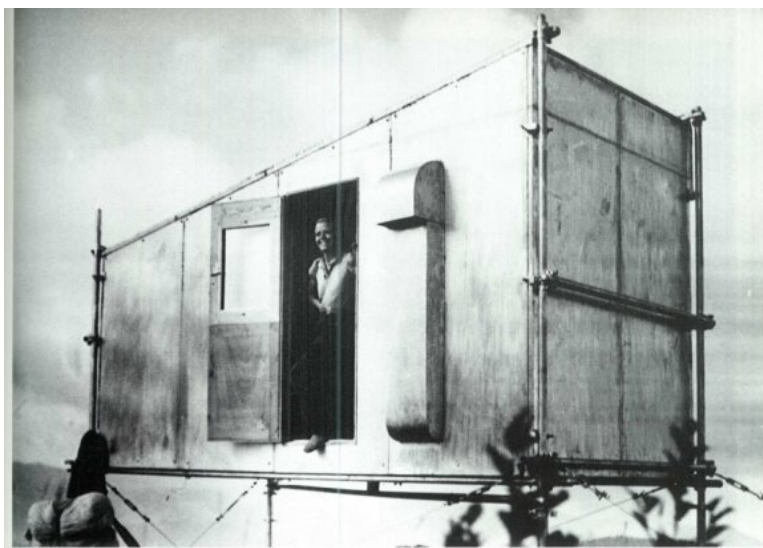
[Ima.34]



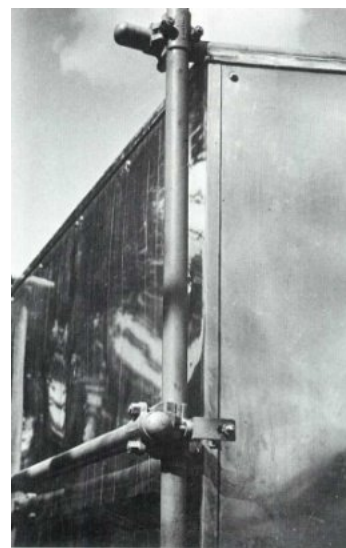
[Ima.35, produced by the author]



[Ima.36, produced by the author]



[Ima.37]



[Ima.38]

opposite air-inlets, that provoke the controlled penetration and output of fresh air. Their placement has not be chosen by chance, as the one that is used as an exit of air is placed on the higher spot of the hut [Im.37]. ²²This way the hottest air which is accumulated there tends to be pushed out by the new airstreams that enters. Given the previous decisions of Ch.P. to protect the sleeping areas by giving them a Southern orientation(protecting them from the cold strong northern winds) I have come to assume that once more she has repeated this practice. Therefore I consider her decision to put the air-inlets in the southern and western facades as a wise one, keeping in mind that the northern air breeze in the high mountain altitudes, is catastrophic and dangerous at times. For this reason they (Ch.P. and André Tournon) decided, to enforce the supporting poles by metal cables²³ that would anchor around the cement foundations.

The fewer and the smaller are the openings of these dwelling the better for the tenants. This is a rule that Ch.P. had in mind and this is why she has put here only one small window facing the West. She paid attention to the surrounding and the environment she was working in, giving to her projects characteristics that would make them first of all good shelters. The inclination that she has given this time to the roof- panels is different from the one in *"la maison de l'agriculture"*²⁴. This is happening because the snow needs a greater sloping surface in order to slide away from the roof, when needed. Here once more she has adapted her ideas to the "data" of the site (of the mountain in this case).

The bivouac shelter not only because of it's size and proportions, but also because of it's special feature of being the most Spartan version of the articulated huts she had produced, led her to seven basic rules she wanted to declare for all of her low cost proposals.

1. resolve of every unit through a certain and specific measure (in this case once more this measure is the length of the beds which she standardize as 2m. long).
2. external skeleton to support the lateral panels, the ceiling and the floor [Ima.38].
3. all of the parts are contributing to the stability of the whole, as long as the definitive stability is achieved through prior calculations, before the articulation of the parts.
4. no panel is weakened from the location of the openings (such as the door or the windows) [Imag.36].
5. functional liberty of every unit of all the different programs, without further modification of the "prototype" unit.

²² note at the original ground plan ,the direction of the two opposite arrows accompanied with the letter G.

²³ Something that reminds us the internal cables of the previous "Cable shelter".

²⁴ In *"la maison de l'agriculture"*, the inclination was 6%, whereas in this shelter the inclination is 18,4%.

6. use of inclined ceiling in order to facilitate the articulation of the internal panels and achieve a better consistency of the lateral sliding panels [Imag.36].
7. very easy articulation, dismantling and rearticulation without laborers y specialized technicians.

This was a small resume of all of her previous projects, that could prove the simplicity of her concept and make her intentions understood to a vast audience of people (this has been her goal right from the start).

2.5 Tonneu barrel shelter

At the same time while she was constructing the bivouac shelter, she collaborated with P.J. in another mountain shelter that they never really managed to built. This project was the prototype of three versions of different lodging capacity. The concept had to do with a faceted cylindrical shaped, “wine barrel” placed in the mountainside.

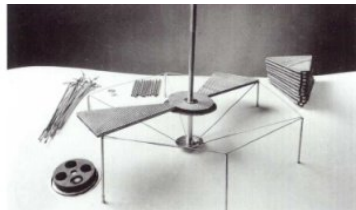
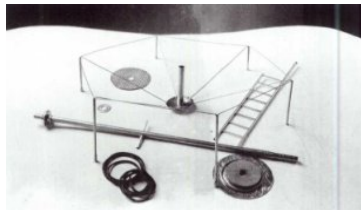
In their supplementary drawings’ text²⁵, they speak of a shelter made of steel, aluminum, duraluminum, silk glass, hardboards , and extra strong paper of asphalt. Like all the previous cases, here again we have to do with a prefabricated shelter made of different ready-made parts²⁶ that were assembled in situ in a short time. Due to lack of complete analytic drawings I had to work with a diagrammatical ground plan that shows [Ima.45] the organization of the beds and the photos [Ima.39-44] of a model made step-by-step. Yet the best archive that I found was that of a photomontage of the 3d model with snowy high mountains as a background and Ch.P. with her skies at the doorstep of the shelter [Ima.44].

Just like in the bivouac project, here once more Ch.P. and P.J. experimented and studied carefully thermal and ventilation requirements, resistance to wind, techniques for easy assembly, durable materials and transformable furnishing in order to accommodate sleeping and daytime activities. They designed a lightweight refuge the parts of which would be easy to carry, not exceeding 2.000 kilos. The panels of the walling would be of varnished hardboard (from the inside) covered with asphalt paper and aluminum surfaces from the outside. They would be rot proof and incombustible. In the same way the assembly of the whole would not take more than 3 days and would require the minimum laborers’ hands (not specialized) and time, due to altitude difficulties of the high mountain²⁷.

²⁵ This is the second time that they accompany with their drawings an explanatory texts, that indicate the concept and the constructive procedures.

²⁶ Ch.P. and P.J. mention that the refuge’s prefabricated parts are entirely produced in the factory.

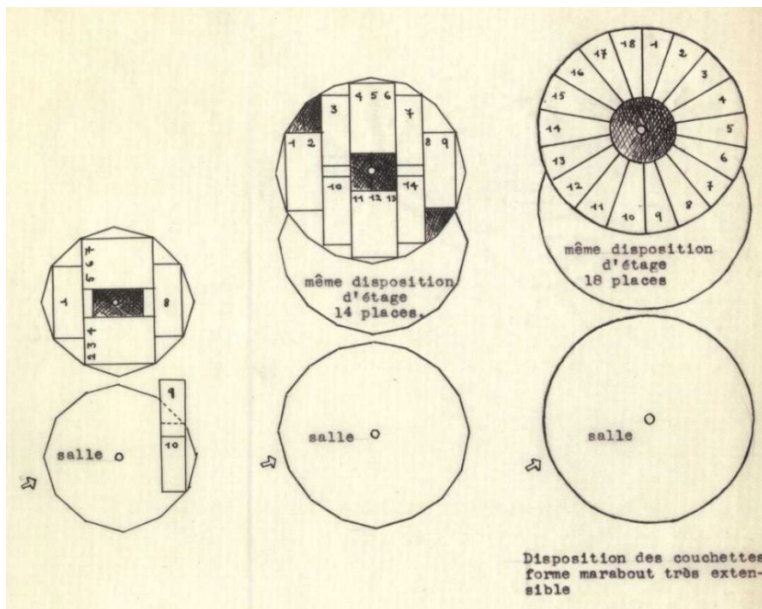
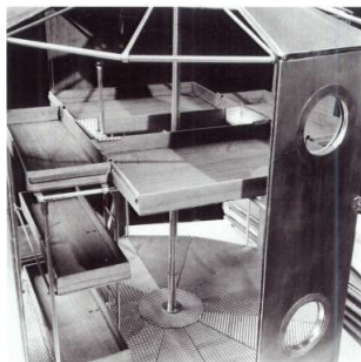
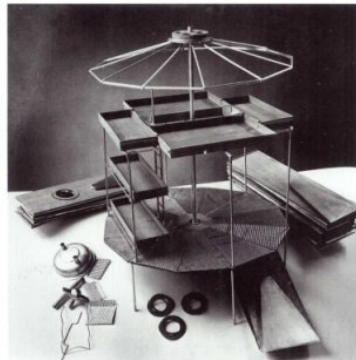
²⁷ This has to do with the “hape” and “haze” phenomenon of the higher mountainsides, that cause headaches and short breathing.



[Ima.39] [Ima.40]

[Ima.41] [Ima.42]

[Ima.43] [Ima.44]



[Ima.45]

Speaking of the form of the shelter Ch.P. and P.J. said that it has been designed to give the minimum resistance of the air. Yet this idea is questionable if we keep in mind the height of the whole construction. We can easily see through that the “cable shelter” must have been a forerunner of this project. Yet it’s shorter height would have worked better against the strong streams of mountain air, while the long surfaces of the “barrel shelter” wouldn’t²⁸. More over this kind of faceted cylindrical form permits the tightening of the joints of the panels, unobstructing the sun to surround the whole aluminum hut and melt the accumulated snow, causing it to slide towards its perimeter. Ch.P. and P.J. don’t miss to study on the beneficial actions of the covering of the snow as well²⁹. Given the fact that a great amount of snow would be accumulated around the aluminum shelter, they imagined a “bucket in the snow” in a way that the surrounding covering snow would protect it from strong winds and diminish the loses of the interior warmth.

Their study over the level of comfort inside this experimental prototype guaranteed the rising of the internal temperature, very quickly only through the simple presence of its guests. Also they excluded the possibility of air penetration through the panels’ joints as they were meant to be rot proof. More over they proposed the combination of a heat ventilator with the phenomenon of the “bucket in the snow”, as a cooperative system that could diminish the internal humidity to the minimum levels. This way the whole structure would be well isolated from the bad weather of the outside.

In reverse with the case of the “cable shelter” here the documents of the images, explain to us clearly the whole structural and functional organization of the shelter. Through these new data we have come to detect better versions of prior techniques and to review misinterpreted assumptions of the past “cable shelter”.

For example here the shelter is made of a skeleton of poles which just like the cables of the “cable shelter”, they were set at the inside of the shelter. Cables that join the peripheral, vertical supporting poles are all jointed at the lower part of the central pole, achieving balance of the supportive forces of the structure. The placement of the beds, is different as we have assumed in the “cable shelter”. At the drawings above we note that as the capacity of sleeping places rises, so does the diameter of the ground plan and the mode of the placement of the dormitories.

²⁸ The fact that the images above show a three level shelter, leads us to the conclusion that the height of this prototype should exceed the 2.5 m. From this height and forward the resistance circumstances for such a light construction are worsening.

²⁹ The same technique is used in the case of igloos. The temperature beneath the snow does not exceed 0°C, while at night in the surface of the mountain is many degrees below 0°C. The Inuit (the race of the North pole), make their igloos by creating small controlled spaces of snow brick, with a lower entrance. This way the heat produced from their bodies and breaths alters the temperature of the interior of these dwelling up to 0°C making it a livable place to be. In general great amounts of accumulated snow have insulating characteristics compared to the uncovered open area.

More over we see that Ch.P. and P.J. in these prototypes propose a free ground floor -to which they refer as “salle”- which works as a common gathering place for dining and storage, whereas they raise the dormitories in the upper area³⁰. Specifically we take the position of the word “salle” as being near the entrance of the refuge. This is also verified by the little arrows that point towards the shelter.

The mater of the bed, as an element of measurement that influences the proportion of the barrel shelter is something that we can understand easier in the examples of the drawing she produced for the School of pilots of the army. The documents that I had in my reach, state that Le Corbu and P.J. [Ima.47] had worked on a project for a refuge of the pilots of the army and that she had to produce a proposal over organization of the dormitories inside [Ima.46]. Yet the background of [Ima.47] and the similar image of this refuge next to a tent of airplanes, complicates the facts. Beyond no doubt, this is the same prototype of the barrel hut, set in a different outdoor scenery. The setting of the beds leaves distances between two lower beds, while placing a third one above them [Ima.46]. We can see how the side of the upper bed coincides with the acmes of two panels. This is a detail that we also point out at the previous second prototype. Based on Ch.P. writing she collaborated with P.J. for the barrel shelter.

Here we are not going to prove whose idea was it or not. In any case the history (and the truth) of this result hides in Ch.P. anterior sketches, that can be related to this one. Just like in the competition of “*L’architecture d’aujourd’ hui*” where she and P.J. produced the minor prototype based on the sleeping places, here they apply the same rule, this time, in a multi leveled structure.

2.7 Shelter of double construction

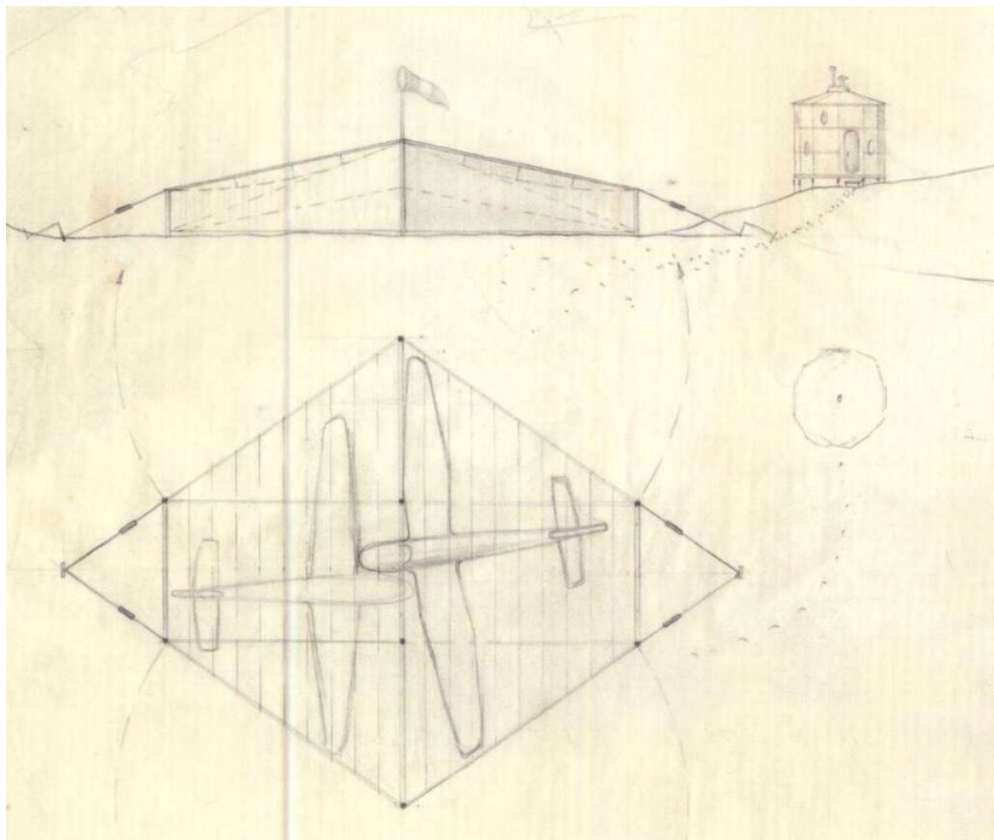
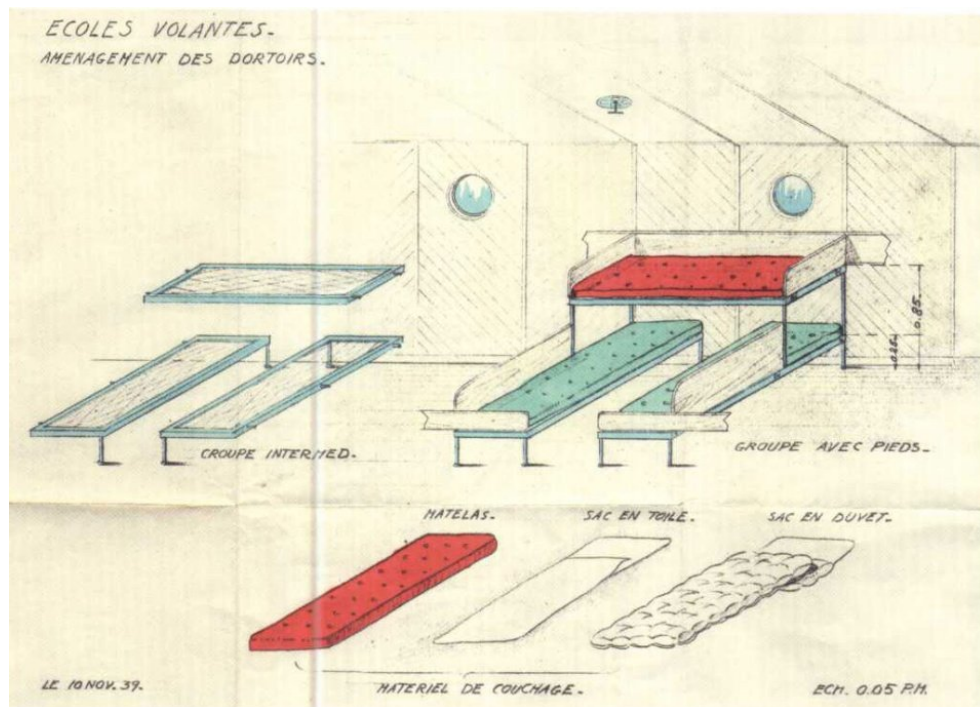
The shelter of double construction is a project that she and P.J. proposed in 1939 ,and while she was gone from Le Corbu and P.J.’s atelier, as a do-it-yourself structure that could host 6-8 people(peasants, mountaineers, soldiers). Through this study she presented two prototypes of articulated huts of 2m.x 4 m. [Ima.50] and 4m.x4m. [Ima.48, 49] made of plywood and insulating materials that one could find in the territory around of every site³¹.

From the materials, their internal organization, their lack of a separate supportive structure and foundation we conclude that these proposals were more of a quick, non-expensive solution, for those who couldn’t get aluminum boards and create movable internal parts. This was a period while the Spanish civil war had collapsed and the Europe was being

³⁰ Let us not forget that at the section of “*cable shelter*”, CH.P. showed a two-level dormitory, without any evidence of further services.

³¹ They specifically suggested straw and haystack as possible insulating materials between the internal and external wooden panels.

[Ima.46]



[Ima.47]

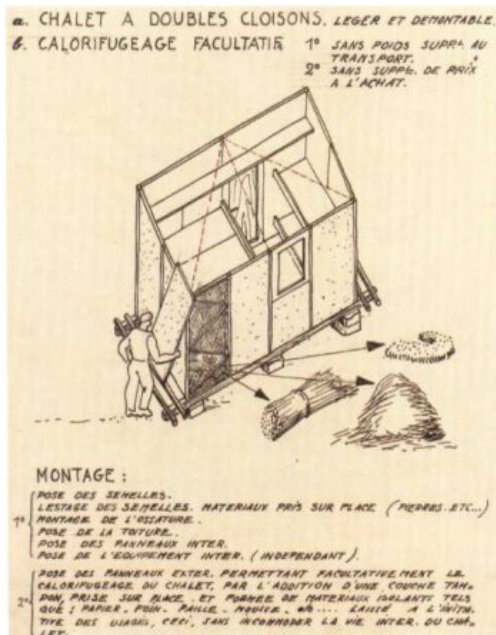
threatened by the fascism of Hitler and Mousolini. Apart from her energetic political beliefs against this ideology Ch.P. sensed the lack of goods and had realized that now more than ever they should go back to the basics, as far as their constructions were concerned. This was a moment that she proposed the simplest of her ideas.

Here we have some drawings – a 3d axonometric and two sections of the prototype of 4x4- that show certain controversies with her prior solutions.

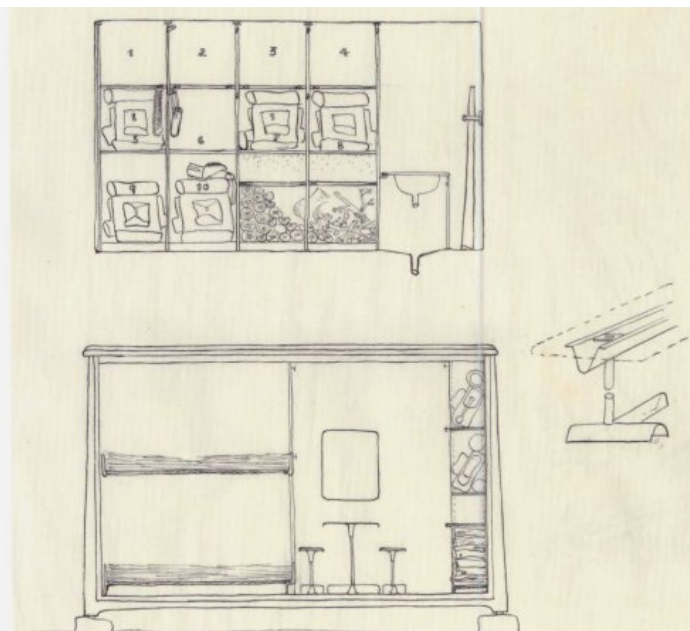
For example we see that the vertical roof is now slightly leaning towards the longest side of the roof (this is the 4m. dimension) [Ima.48], while the beds are now turning vertically, being fixed in a permanent position. The measure is once more the long dimension of the beds (2m.) creating the first “sleeping” unit of the hut. The second unit, that of the living area (storage- dining) is equal to the first one and is equipped with a small table, two benches, many cupboards for storage and a sink that leads the water at the outside through a hole at the floor [Ima.49]. The hut can host six tenants, and is smaller than the “*bivouac shelter*” (it is obvious the relation with it). Therefore it is not that spacious. It is supported on three spots (at the two sides and in the middle) on a kind of punctual, well shaped rocks or bricks, keeping a low height (contrary to the prior models). The riddle of the above sketches is the 3d sketch of constructive detail at the right of the sections. It describes the joint of a supporting horizontal board, yet I haven’t reached to a conclusion about which part of the hut it concerns. The second prototype of 2m.x4m. comes with a ground plan and two sections [Ima.50]. It is very similar to the 4m.x4m. prototype and to the “*bivouac shelter*”. Its concept is based on the two-unit hut, non the less this one has a free-shaped table (typical of Ch.P.) that can be moved upwards creating more free space. Also we note that the stove has now moved at the right of the entrance, next to the section of the dormitory. This is happening because this time the tenants will need a better heating method, as the arrow pointing the left higher corner of the ground plan, explains the direction of the strongest air streams. The drawing is well described with explaining notes and dimensions, yet it is obvious that it concentrates on the settlement of the interior space, cutting out the important detail of the whole construction.

The study of these prototype was meant to lead to the development of huts that would apply to many special occasions. It is characteristic the mail of P.J. and Ch.P.³² explaining her how they had received an order for the construction of 300 hut of the prototype 4x4, for a camp of the army. Given the velocity of the political and national changes the deadlines that period were very tight, and they had to confront lack of materials, not to mention lack of specialized engineers (to help them with the structural details) who had gone to enroll to the army. Their answer had

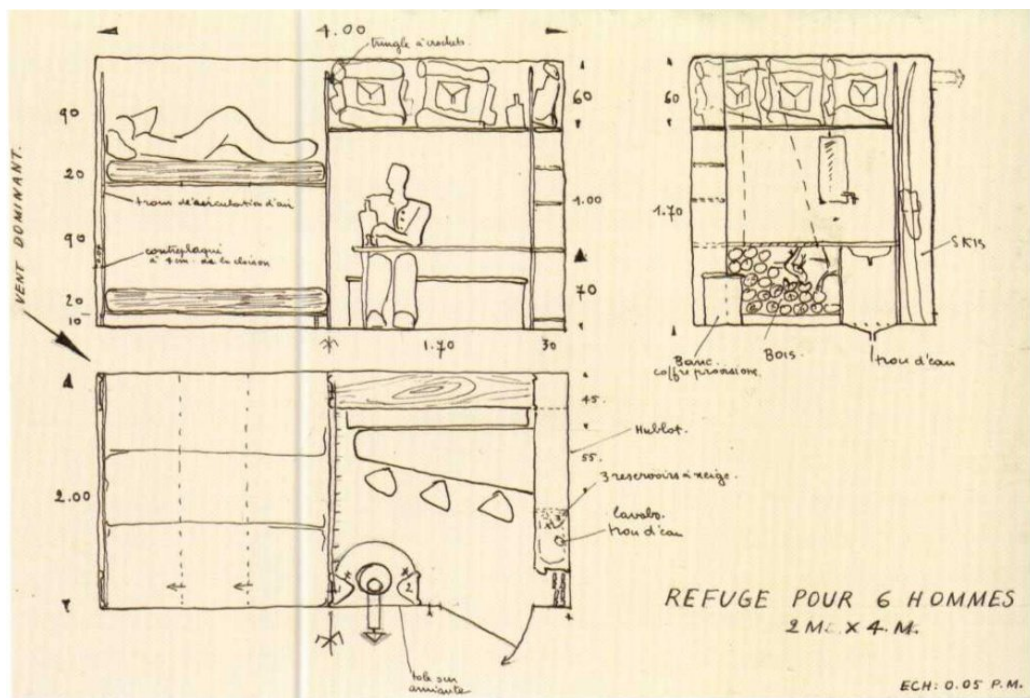
³² Barsac Jacques, Charlotte Perriand: un art d’ habiter 1903-1959, Norma, Paris 2005



[Ima.48]



[Ima.49]



[Ima.50]

to be quick, well described and easily understood (they are presented with their basic information without any complicated structural details³³).The truth is that right from the start, the army hadn't asked for spacious facilities that would stick out for their commodities. This is why these prototypes, use the minor of the dimensions to get the maximum of their functional space.

As Spartan as they may seem, these last examples, Ch.P. and P.J. wouldn't have reached to this result without their immense background with the subject. Walking always on the basic axes of their primary concepts they managed to develop their ideas, through experience and circumstances, and to convert them in multi-applied examples for many occasions.

3. The minimum dwelling

Ch. P. lived and worked in a period with important changes in the social structure; during a housing crisis following World War I, that tended to affect directly the middle income groups and impoverish the working intellectuals. Every sector of the contemporary world was trying to adapt new measures that would serve the capitalist philosophy, that was going to rule the world. The catch-phrase "minimum dwelling", is something that got under investigation by the majority of the avant-garde architects of the modern era, around the World, and is something that is also hidden in Ch.P.'s sketches for the mountain shelters.

The dimension of the living surface per person decreased, and new elements, such as the bathrooms and the hallway, appeared in the apartments of the new collective buildings of the working class. Three of the most typical examples of this kind of dwelling have been the shown [Ima.51-58] collective residencies in Berlin, Frankfurt and Rotterdam during 1929-1933. In Frankfurt, [Ima.51-52], Franz Roedcke proposes one bedroom not only for the couple, but also for every member of the family, by diminishing the size of the kitchen. In his 80m² apartments we also recognize two novelties. A well organized bathroom and a hall that acts as distributor of the functions. In the following four examples [Ima.53-56]of the Siemensstadt Residency in Berlin, the architects (Bartring, Forbat, Häring , Gropius)confronted the problem of the minimum dwelling face to face, as they worked on new dimensional aspects, on different functions of every section and on the comfort conditions according to the best placement. Characteristic of these dwelling is the opening on both Eastern and Western sides ; the division in sleeping and living zones³⁴; the kitchen and the living-dining room are separate with an intermediate connection ; the balconies³⁵ stand as prolonged extensions of the living room and the hallway manages

³³ This happens not only because the idea had to be easily understood by the clients –the generals of the army-, but also because the concept consisted of an easy do-it-yourself assembly, that could easily be explained with some rules, as we can see in the first axonometric drawing of the prototype 4x4.

³⁴ something that as we are going to see later exists also in CH.P.'s mountain shelters.

³⁵ The balconies and the windows in the service rooms convert in obligatory elements in these new-type dwellings. This way the apartments would be well ventilated and therefor better places to live in.

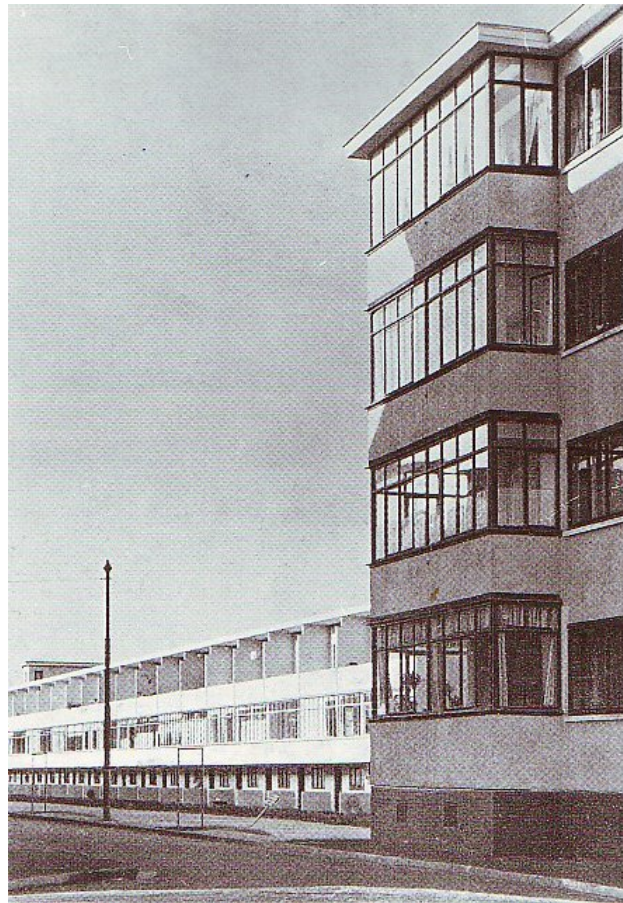
the distribution between the sleeping and living area. On the whole these four types of apartments manage with success, a social, functional and hygienic program with the minimum dimensions. In the case of Rotterdam, we can see also how, the 47m² apartment unifies the space of the dormitories and the living area, by the sliding panels. Here again, this is a side to side apartment, that opens to a balcony.

Due to their intellectual connection and their time of construction the above examples seem very alike. Yet according to different lifestyles, social content and ideologies there have been developed three types of small apartments that conceived the kitchen as the regulative factor of the housekeeping.

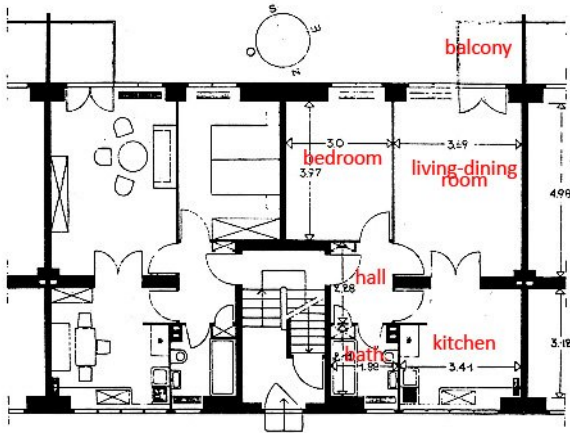
| APARTMENT | NUMBER OF ELEMENTS | LIFESTYLE |
|------------------------|--|---|
| with a live-in kitchen | as a single room OR as one room & a kitchen | lower class workers |
| with a small kitchen | kitchen & one or three rooms | middle class workers |
| without a kitchen | one room for every adult | people who spend most of their time outside the home, returning there only for sleeping |

Generally there were being many attempts to gain functional space out of the minimum surface. In this way the architects borrowed exemplar solutions from the cases of the great transporting machines of the modern world, such as the trains. From the following board [board 1] we can see the comparison of the typical kitchens [Ima.60] around the world and the kitchen of a railroad's train [Ima.59], based on their surface and their productive ability of meal. The fact that the smallest kitchen of a train wagon can produce the most meals, shows that the key to this kind of problems is the correct ergonomic composition of the used space. Going on further we can see in the [Ima.60] the form and the lineal, spatial organization of this type of kitchen. Accordingly we present a typical modern kitchen made by B.Fuchs. which resembles in many ways with the lineal example of the train's kitchen. In general lineal organization with opposite placement of the washing, storage and cooking banks, leaving in the middle a corridor for free circulation of movements. Nevertheless the success of the new kitchen was also due to the accurate enclosure of the majority of it's services in new compacted furniture [Ima.64]. This philosophy tends to abolish from the "new type of apartments" (45-55m²) the old bulky furniture that belonged to the previous urban apartments of the 19th century, with lesser and smaller "tools" for the basic needs. This way new kind of smaller multi-furniture fold, enclose and hide the equipment of the house. As the well known slogan of the era "Less

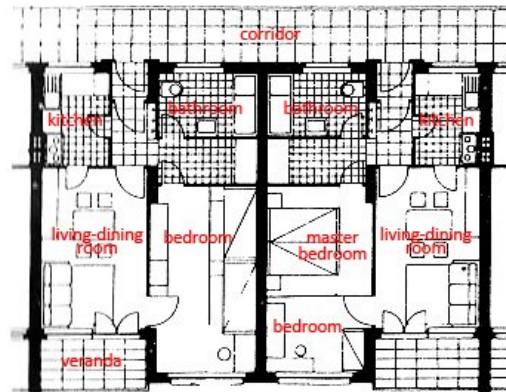
Siedlung Heimat –Franz Roeckle
(Frankfurt 1927-30)



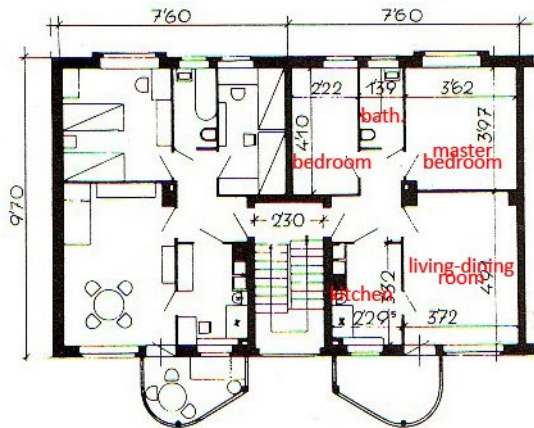
Siedlung Siemensstadt (Berlin 1929-30)



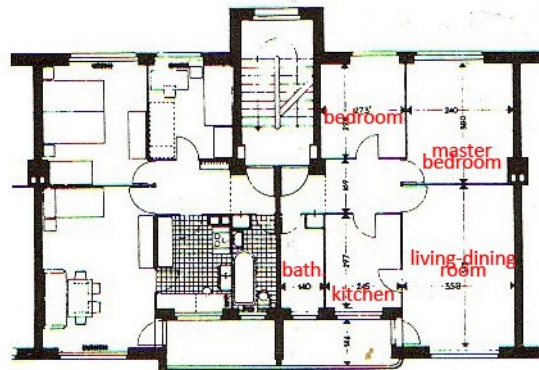
[Ima.53, apartment by O. Bartning]



[Ima.54, apartment by W. Gropius]

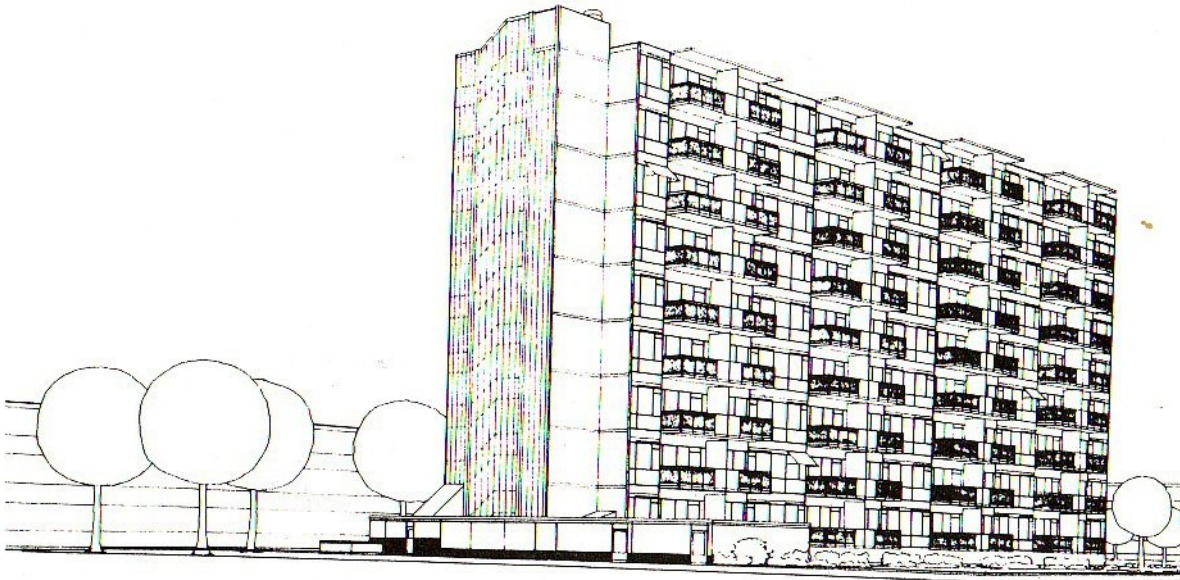


[Ima.55, apartment by F. Forbat]

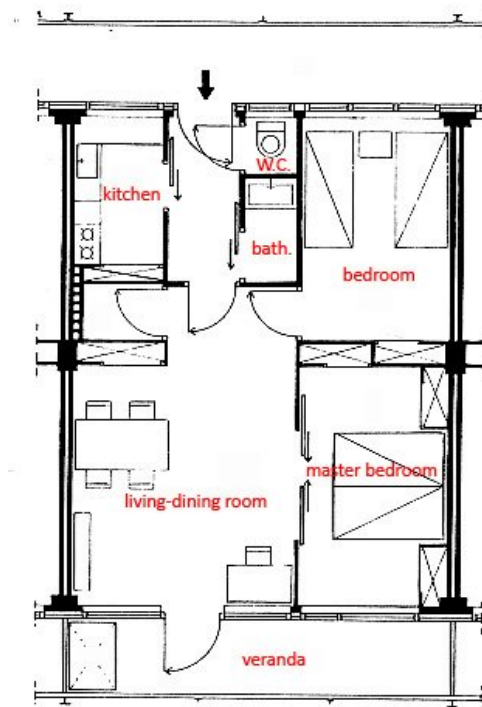


[Ima.56, apartment by H. Häring]

Bergpodler building
Willwn van Tijen, J.A. Brinkman, L.C. van der Vlugt
(Rotterdam 1933-34)



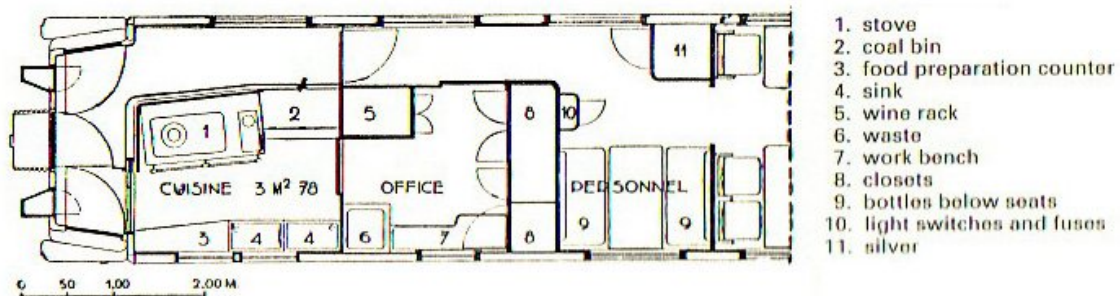
[Ima.57]



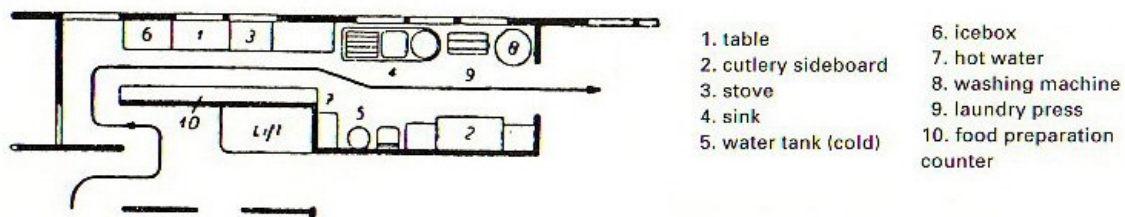
[Ima.58]

| TYPE OF KITCHEN | AREA m ² | AVERAGE NUMBER OF DAILY MEALS |
|---|---------------------|-------------------------------|
| in urban apartments of the 19 th century | 25 | 4-10 |
| in common and medium apartment | 11.50 | 2-6 |
| standardized American | 8.91 | 2-6 |
| standardized Belgian | 8.65 | 2-6 |
| standardized Stuttgart | 8.60 | 2-6 |
| standardized Frankfurt | 6.43 | 2-6 |
| standardized Frankfurt (second phase) | 5.50 | 2-6 |
| standardized Berlin | 4.50 | 2-6 |
| kitchen of a railway restaurant car | 3.78 | 100-150 |

[board 1, data from book Karel Teige, *"The minimum dwelling"*, MIT Press, Massachusetts, 2002]



[Ima.59, kitchen of railway dining car, 3.78m²]



[Ima.60, the modern kitchen by B. Fuchs combined with laundry room]

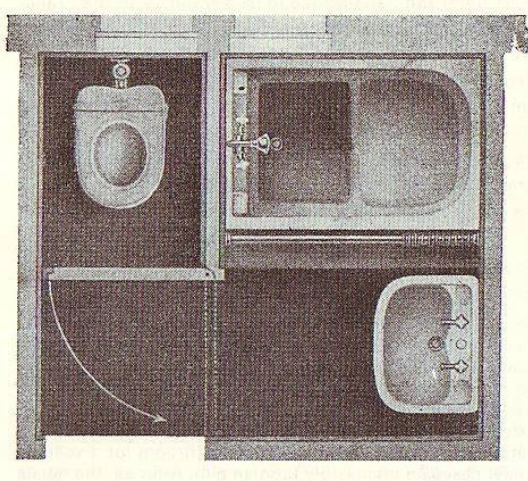
is More”, everything gets compacted in order to use the minimum space and serve to the maximum. Through the case of the kitchen, the new element of the modern housekeeping the W.C. – a previous luxury³⁶ – was proposed, with the minimal proportions, as the “must” of the hygienically advanced modern world.

Using the dimensions of a furniture, the “new room”, serves only the basic needs. The compacting procedure that ruled the modern kitchen has come to serve as well in the case of the bathrooms. Services (preparation, cooking, storage, cleaning) that extend through articulated parts and close back in solid cupboards.

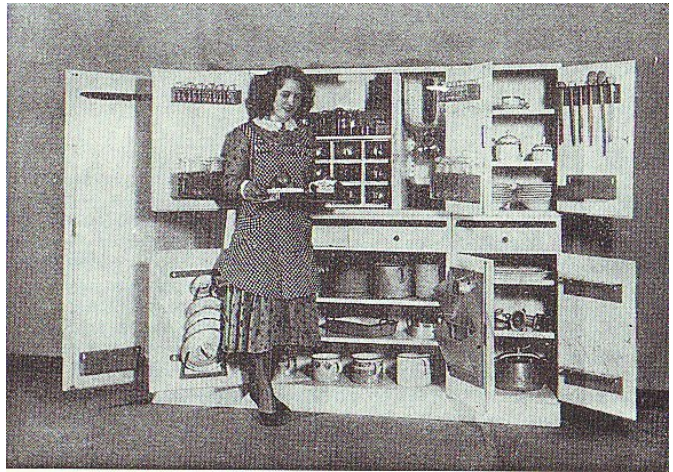
As shown below, the “Frankfurt bathroom” uses a surface of 2.55m². By dividing the whole in two separate parts – the tub area and the bath area, it uses the turning ability of the internal door to isolate every section. A similar philosophy of a two-section bathroom we detect in the outdoor W.C. of Ch.P.’s “la Maison au bord de l’ eau”. Apart from the special resemblance we note that the surface as well - 2.9m² - is close to that of the “Frankfurt bathroom”. Staying at the same project we concentrate once more in the kitchen area, recognizing Ch.P.’s tendency to create a small nevertheless live-in kitchen, similar to the prototypes of the previous era. At this point let us remember that this kind of leisure dwellings, is used for relaxation and entertainment. The dwellers are supposed to spend a great deal of their time, at home. As shown [Ima.63] the kitchen is supported by a indoor and outdoor living area. This proves that the reason for a small and live-in kitchen is the fact that the vacationers use the kitchen as one of the most important living spaces, yet the preparation section is reduced to the minimum due to the limited practice of the cooking services. The kitchen in a dismantled wooden shed is not supposed to be similar to that of a permanent apartment space.

Through this brief investigation in the tendencies of the minimum dwelling of the early 20th century, we intended to prove to which extent Ch.P. was influenced by its practical applications. The major proof of our intentions is found in the example of the Tritrianon project [Ima.66] (“la Maison de l’agriculteur”). Apart from the fact that CH.P. uses, generally, every unit for separate services (non the less the dining bank can be converted to a bed) such as sleeping and living, we note how she contains in the minimum living area a kitchen and a W.C. Let us pay attention to the [Ima.64] of M.J. Ginsburg’s kitchen and the Dessau closet [Ima.65], which are the typical examples of a minimum spaces. Comparing these images with the plan of the Tritrianon, it is obvious their identical resemblance. We know that CH.P. lived and worked in the environment of Le Corbusier’s “Le Modulor”, something that must have set her standards in new bases. Yet these images are the most solid confirmation of her backing to the general fluent for the reduction of the measures.

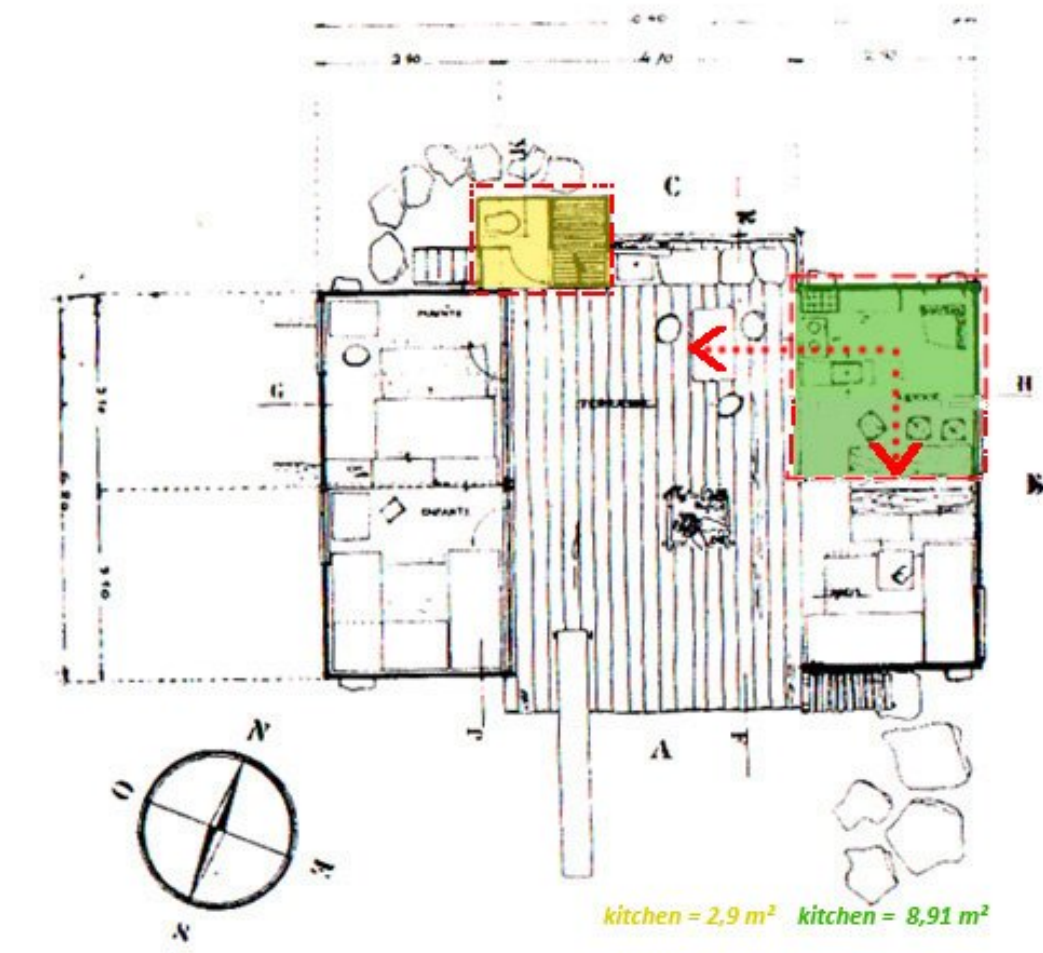
³⁶ the first collective dwellings of the so called socialistic societies, proposed for the dwellers common bathrooms, dining and laundry areas converting the private apartments to sleeping dwellings.



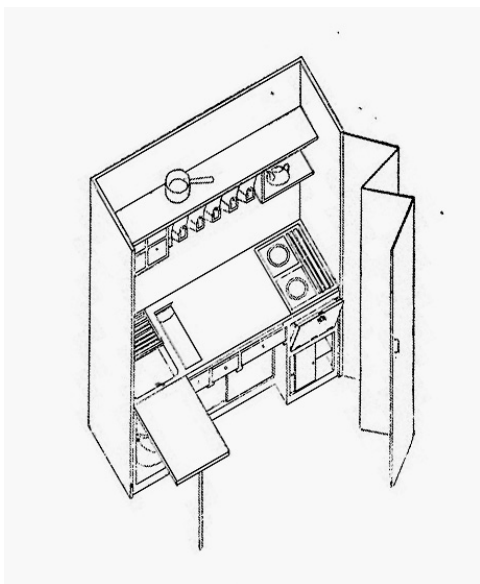
[Ima.61, Frankfurt bathroom, unit's dimensions 1.7x1.5m²]



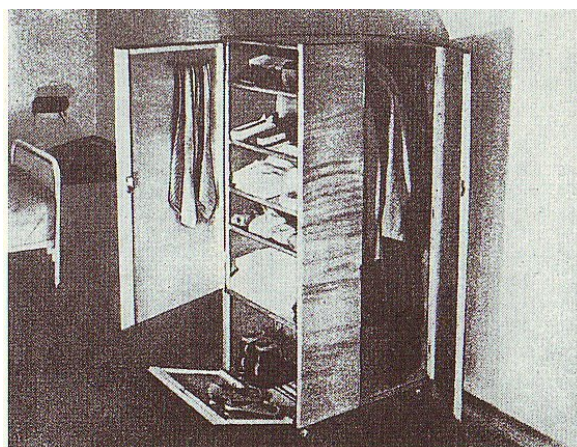
[Ima.62,SAB kitchen]



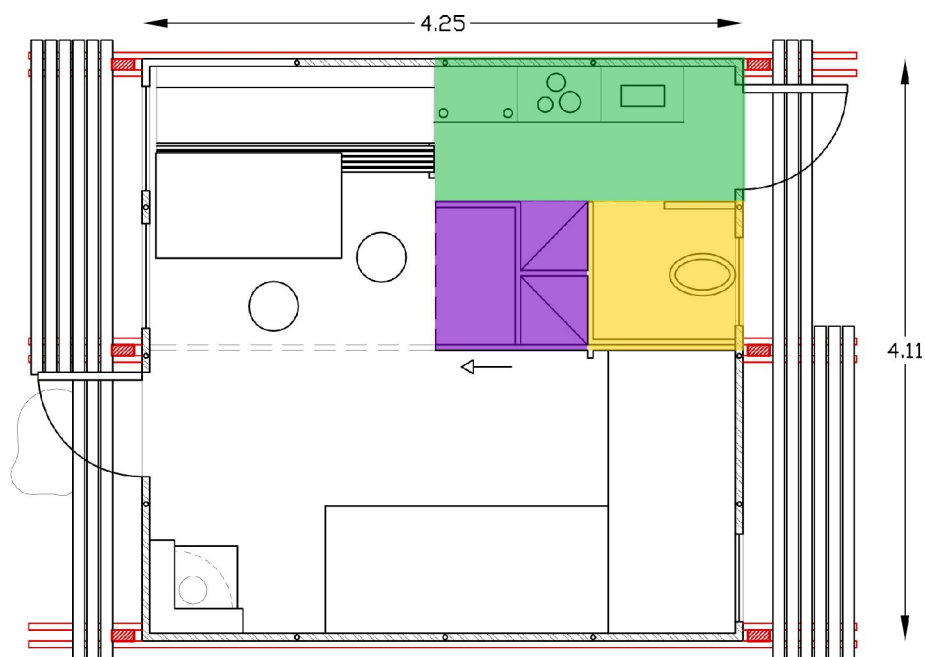
[Ima.63, produced by the author]



[Ima. 64, M.J. Ginsburg kitchen]



[Ima.65, Bauhaus-Dessau 1930, clothes storage closet]



deposit = 1,12m² W.C. 1,15 m² kitchen 2,19 m²

[Ima.,66, produced by the author]

The truth is that the proportions of an articulated barrack that can be dismantled and reconstructed right from the beginning can't be the same with those of a real apartment. However it is clear how she uses many of her eras amenities (the small self-standing kitchen and the W.C.), in order to provide her projects with the best living conditions.

Starting from the prior, much larger projects ("la Maison au bord de l' eau", "la Maison de l'agriculteur") she goes on to the more Spartan and smaller ones, by including ("Bivouac shelter", "shelter of double construction") or excluding ("Cable shelter", "Tonneau shelter") at times these service spaces. As the altitude of the placement rises, the more these spaces tend to disappear from the interior of the shelters. This has to do with the ideology of the mountaineering, that places the biological needs of human (such as the need for a W.C.) at the outside, tending to exploit the maximum of the small space that is provided.

Moving panels for separating the space, moving cupboard and furniture that enclose whole service units and limited proportion based on the measures of the new furniture, form the characteristics of the avant-garde period of architecture. A period of which Ch.P. was a worthy representative.

4. Secondary interpretation

Following the first analysis of the previous presentation, here I attempt a second more categorized analysis, based on specific themes that immerse from Ch.P.'s projects. Having distilled from the documents in my disposal the basic composing axes, I managed to complete the missing ground plans. In the [Ima.67], I appose them all together, trying not only to compare them, but also to understand their evolving track.

The typological categorization and the schematic relation is obvious. Yet I am going to leave the evolving comments for the next chapter. Here we are going to identify the elements of her composing method.

4.1 The openings

From the photographs, the photomontages and the drawings we have understood that for Ch.P., nature [Ima.21,22,23,44] and its image [Ima.19], was something that had to be included in the produced space.

Though she intended the immediate relation with the surrounding environment, the way she placed, and designed the openings had to do more with the achievement of better living conditions at the interior. Nevertheless it is easy to see that the way she handles the openings at the huts of the valley ("*la maison de l'agriculture*", "*la maison au bord de l'eau*") is different from that of the pure mountain huts.

In the first two examples [Ima.19] she strives for a whole incorporation of nature in the huts. She uses large movable panels³⁷ and large windows, that convert the interior to exterior. The weather conditions in the proposed sites permit this kind of handling. On the other hand the following cases place more complicated questions that diminish her “dimensioning” liberty. The huts in the higher mountain zones, not to mention the Spartan soldiers’ huts, need no certain view. The aggressive weather conditions³⁸, and the need for a non-luxury place to sleep³⁹, demand small or no openings that serve only for air refreshing reasons. Accordingly, then, Ch.P. proposed opposite or diagonal, small perpendicular and rounded⁴⁰ doors, platforms and windows, that create fresh air streams every time they are opened. For their constructions she moves from the plain wood, for the cheaper and less demanding cases, and duralumin for the shelters that need better technically, insulating characteristics.

4.2 The indoor comfort conditions

Studying and designing small spaces that host a group of people is a complex problem that asks for the maximum comfort in the minimum surface. This problem is trivial as far as the two first examples are concerned. Due to the spacious and the well-ventilated of these rooms, not to mention due to the temperate climate, the internal conditions tend to be easily controlled.

For the heating, CH.P. proposes fireplaces that are placed in the corners, in order to take advantage of their perpendicular shape. The “font of heat” is usually placed in the unit where the tenants tend to be living most of the day. This is why in *“la maison au bord de l’eau”* the fireplace situated in the kitchen, whereas in *“la maison de l’agriculture”* is placed in the sleeping unit of the parents, opposite of the dining table⁴¹[Ima.68]. This second case has to do with a smaller space that is developed in two equal units side-by side. The living and the sleeping areas are placed diagonally opposite mixing the functions of every unit. By this trick movement and heating of both units is achieved.

In the cases of the following shelters, Ch.P. confronts more serious problems. The fact that these dwellings tend to be smaller, and are made of the experimental combination of plywood and aluminum panels increases the degree of their constrictive difficulty. As far as the smaller ones⁴² are

³⁷ having the size of a wall

³⁸ cases of “cable shelter”, “bivouac shelter” and “Tonneu shelter”

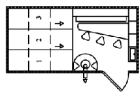
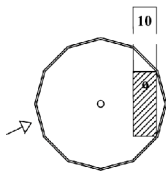
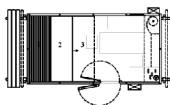
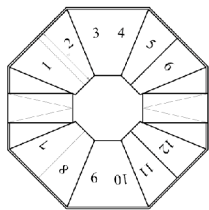
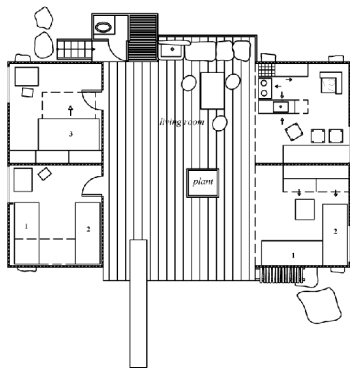
³⁹ the shelters of 4x4 and 2x4

⁴⁰ so as to resemble to a boat’s or a spaceship’s openings. In this way she is trying to create a metaphor for the ephemeral and the artificial of these dwellings, showing that these huts are not here to stay. Her prefabricated strategy had been based on this belief. She loved the life and sports in nature, yet she conceived every constructive human work as an exploitation of natural sources. These primary projects of hers, propose the minimum violation of the environment by standing on poles and by being easily dismantled and removed.

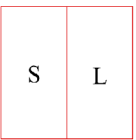
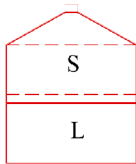
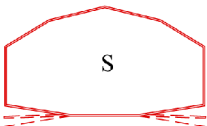
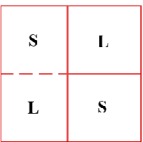
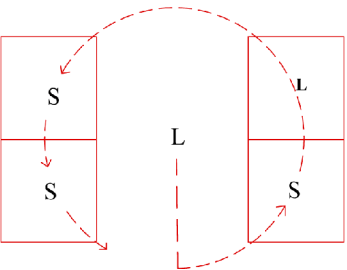
⁴¹ The bench of which converts into a third bed for the children. This position has the same distance with the parent’s beds.

⁴² these are the cable shelter, the Bivouac shelter, the Tonneu shelter, the 4x4 shelter and the 2x4 shelter.

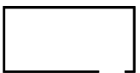
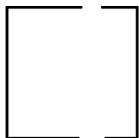
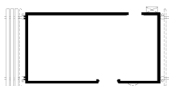
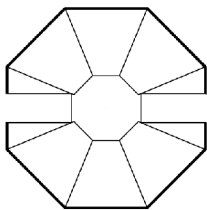
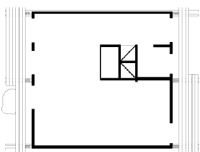
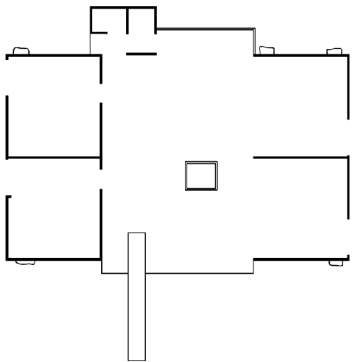
ground plans



L: living area
S: sleeping area



openings



[Ima.67, produced by the author]

less innovative, limiting the experimentation to the application of the metal sheeting as roof covering and the type of the foundations.

We note how in *“la maison au bord de l’eau”* and *“la maison de l’agriculture”*, the type of the foundations, varies between heavy solid rock walls and smaller concrete footing. The surprising detail in one of these constructions is the material of the deck beams. Zooming in, in one of the sections [Ima.70] we note that the main supportive beams of the wooden platform of *“la maison au bord de l’eau”* are metal and not wooden, having an I-shaped crosscut. She proposed a metal frame, based on rock walls, and covered with a wooden deck. This shows that Ch.P. ,since the beginning , was open to every redemptory solutions that would serve better her goals⁴³.

Her following projects showed a more daring temper, being made of complicated metal, aluminum and wooden combinations. She proposed tubular metal poles, tensing cables, rot-proof and two-sided panels of plywood and aluminum. Her proposals were usually followed by explanatory sketches and notes of the appliance details, such as the secret cavities of the joining panels of the “cable shelter” [Ima.28] and the incombustible acmes of the “Tonneu shelter”.

She strived for cheap, durable, flexible and light examples. Her investigating experiments were concentrated on the main construction, whereas the interior equipment was made of wooden, moving, articulated parts.

4.4 The skeleton and parts

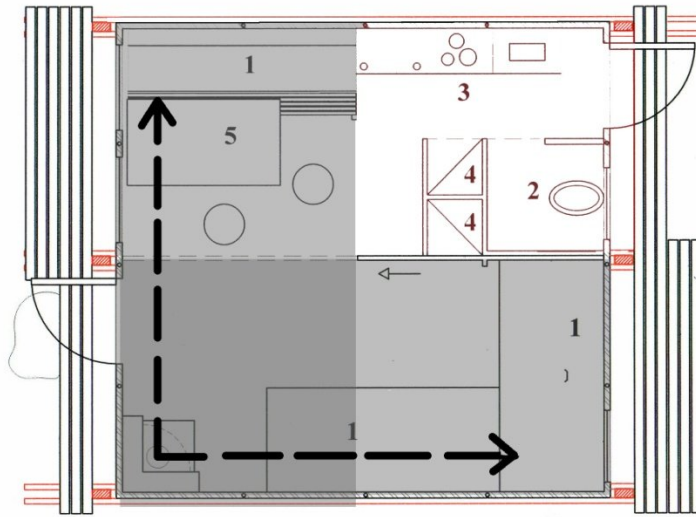
An important evolving element of CH.P.’s mountain huts, is the skeleton and it’s structural parts. Her applying techniques are divided in two categories.

- a. the separate external structure
- b. the embodied interior cable/metal net

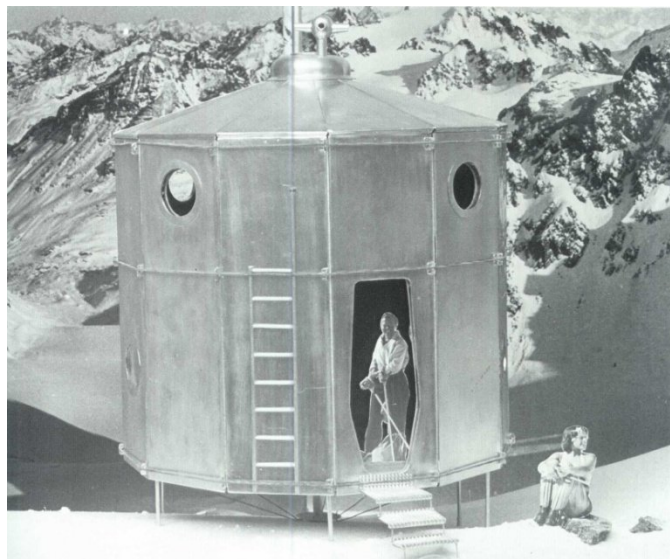
This is a fundamental separation, according to the evolving typology of the [Ima.67]. Considering that all of her projects were elevated over the ground (0.5 m - 1m.), she worked intensively in the construction and aesthetic of their skeletons. The photograph [Ima.38] of the detail of the adjoining skeleton poles gives as a remarkable sculptural proof of her work.

Her main concept had to do with the idea of a volume that would be placed and fixed in a “supporting structure”. The kind of this structure would vary from plain wooden posts to metal tubular poles. The volume would be made of self adjoining separate panels that would create a solid whole. The supporting skeleton would be a separate structure able to hold and keep the volume in it’s place. It would be based on concrete (*“la maison de l’agriculture”*, “bivouac shelter”, “Tonneu shelter”,)or rock foundations(*“la maison au bord de l’eau”*, “4x2 and 4x4 shelters”)and it would be belayed by tension cables that would anchor to the ground.

⁴³ her tendency to research for the best appliance of her ideas had to do with her interior design background



[Ima.68, produced by the author]



[Ima.69]



[Ima.70]

concerned Ch.P. doesn't propose any kind of heating at all, as she values the ability of the human body to generate warmth, heating it's small surrounding. She actually mentions in her the texts of the Tonneu shelter that the dwelling, first of all can be heated just by it's tenants' presence. She makes sure that the dormitories have the best orientation so as to be protected by strongest winds and the North⁴⁴. The exception to this rule is the example of the shelter 2x4, where we note the obvious placement of a stove next to the dormitory, almost in the middle of the hut [Ima.50]. As I have mentioned before, this must be happening because this time the dormitories are struck by the strongest winds of the site, as the little arrow on the left shows Ch.P. first serious involvement with the study of indoor comfort was on the *"bivouac shelter"*, when she experimented with the ventilation system. She had to apply a system that wouldn't demand the opening of the window or the door in order to refresh the breathing air. Her second investigation over the living comfort was in the *"Tonneu shelter"*.

Along with P.J. they randomized the beneficial symbiosis of the human body and the snow, proposing a secondary combining system of a *"heater"*⁴⁵. As we can see in the [Ima.59], the smoke pipe is coming out from the roof of the *"metallic"* hut, having a centric placement. Yet the investigation of the internal comfort was expanded also, to the appropriate technology of the covering panels of the wall. Before deciding the proper material for the walling, CH.P. and P.J. experimented with panels of plywood and hardboard. Their investigation came to the conclusion that the hardboard had a better ability to absorb the internal water vapor, produced from the increased temperature, extracting it to the outside. This result, led them to the combined proposal of varnished hardboard panels at the interior and aluminum panels at the exterior. Non the less this solution was never verified, since the Tonneu shelter was never built.

4.3 The materials

Mountain hut, and weekend sheds, as a form of a new leisure culture, were more or less recent and experimental dwellings. Their demand for simple and collective living, in addition to their low-cost profile presupposed application of new materials. The huts had to be prefabricated in the industries, and light enough in order to be easily transported to the site Ch.P. due to her interior and furniture design background she had certain preference to wood⁴⁶, yet her intriguing character kept looking for innovative applications, towards the modern stream. Her prior projects, are

⁴⁴ however we don't have a clear evidence of every case's orientation.

⁴⁵ they don't make clear the way that this heater works. We assume that thia has to be a wooden stove.

⁴⁶ as CH.P. admits, (Studio 97,no.433 [Apr. 1929], 278-9),while she was working in the atelier of Le Corbu and P.J., and during her collaboration with Jean Prouvé, she had to put aside her interest for wood, as the material of the new era was the metal.

Nevertheless she headed towards a total absorption of the skeleton, in the main structure. In the case of the “*cable shelter*”, is the first time that she talks of, the absence of a solid separate supporting structure, whereas she counterpoises a self-standing covering with internal tensing cables, that run through the free space. This uncompleted concept converted into the internal, metal skeleton of the perimeter of the “*Tonneu shelter*”, where the dysfunctional cables are kept outside and under the hut.

4.4The furniture

Apart from the well presented drawings, of these shelters, all of Ch.P.’s primary sketches didn’t come with any kind of specific service furnishing. Only the beds were included and shown in every one of them.

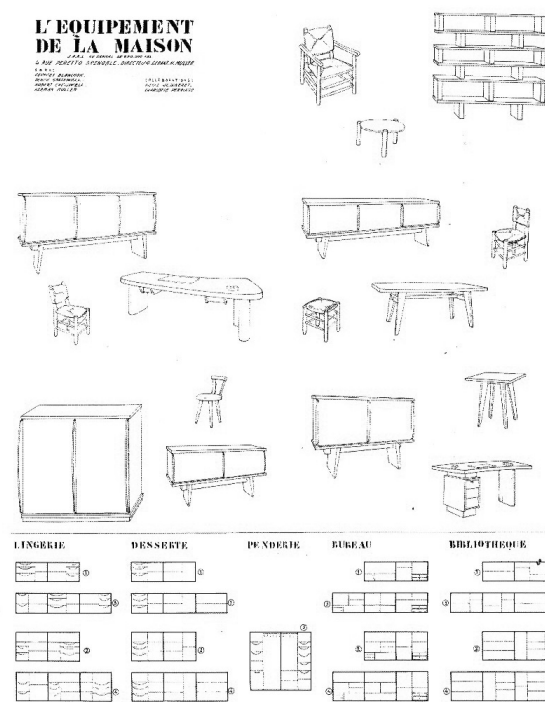
Ch.P. had been made famous because of her collaboration with Le Corbu, P.J. and Jean Prouvé, in tubular furniture. Based on her prior studies she was more than anything else an interior designer, being able to conceptualize the shape of a chair, a desk and a shelving unit, proposing new forms and materials. This was what she knew to do best. Yet her relation with Le Corbu, didn’t permit her to work freely with her favourite material; the wood [Ima.71]⁴⁷. Here in the cases of the shelters, she had to work with small spaces that had to be cheap, flexible and practical. Her experience over the formalities of the everyday life in the mountains and outdoors, served her in many ways.

First of all she applied cheap surfaces of plywood, which is a light material, easy to carry and work with. Secondly she proposed transformable desks and beds, that were easy to move, trying to exploit the minimum of the spare space. The proposals of this kind of furniture seen in these huts gave fruit to many of her posterior furniture as we note in the mages [Ima.71], [Ima.74] and [Ima.72]. The last one is a wooden folding chaise longue that she presented in 1941. We can’t avoid to pay attention to it’s close relation with the folding wooden parts of the beds of the “bivouac shelter”. At the same example we also note her decision to combine the service and depositing counter with the moving desk surface, creating a multiple furniture that fits in the minimum of space⁴⁸. This is something that see uses, once more later in her furniture made for the students’ dormitories for “la maison du Mexique” and “la maison de la Tunisie”.

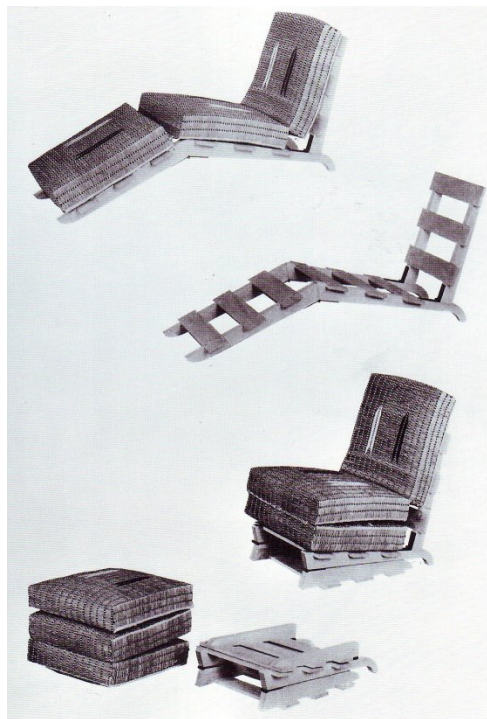
She used to present and promote her furniture in a collective way, like a catalogue of products. More than anything she strived for the mass production of her works, and this is why I present here [Ima.75], in a similar way, the ground plans of the most important types of her shelters’ furnishing equipment. Unfortunately the information recovered from the

⁴⁷ April 1948, publicity sheet for “l’équipement de la maison”, showing wooden furniture, designed by CH.P. and P.J., either separately or together. After her return from Japan, she devoted exclusively to the use of wood. It was cheap and easy to find in a world that was trying to recover from the II World war. Even more it was perfect for the concept of mass prefabricated production that she was trying to introduce for the middle class families.

⁴⁸ She uses the same technique for the case of the free-shaped dining surface of the 2x4 hut.



[Ima.71]



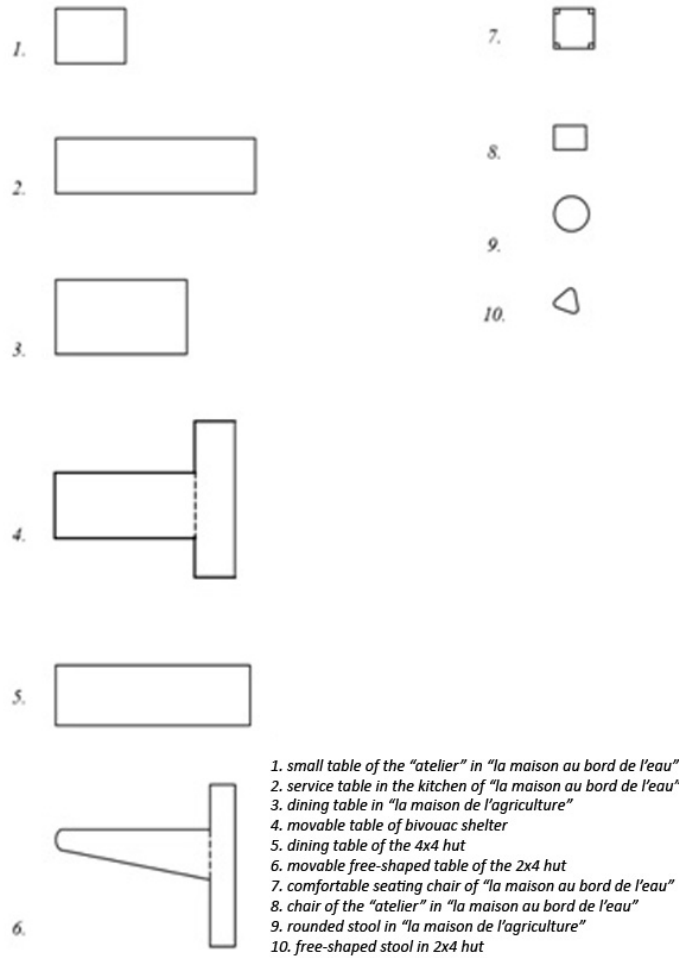
[Ima.72]



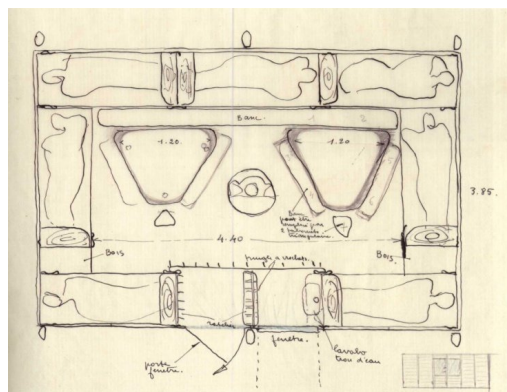
[Ima.73]



[Ima.74]



[Ima.75, produced by the author]



[Ima.76]

documents in our reach didn't permit us dare a more precise representation with more detailed drawings.

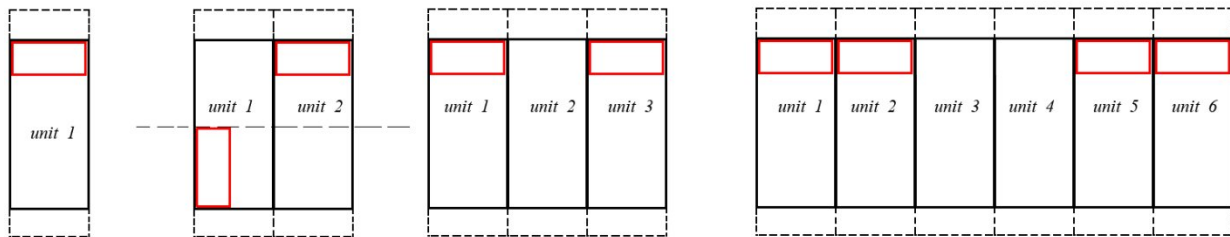
Yet from the above typology we understand her attempt to feet perpendicular-shaped elements in small perpendicular spaces. However there is an evolving novelty that exists in the table and the stool of the "2x4 hut". She applies the concept of the free-shaped objects. This kind of furniture we meet once again in the barracks [Ima.76], that she proposed in 1939, along with Jean Prouve, as a typical soldier's hut. Just like she stated later, when she introduced her typical free-shaped tables as elements of modern house equipment, these free-shaped forms, gave liberty to small-sized spaces, hosting at the same time many people. It is evident to the ground plan of [Ima.76]. The perpendicular beds, are set on the perimeter of the hut, while the free-shaped tables make room for the easier circulation of this small dwelling.

4.6 The beds

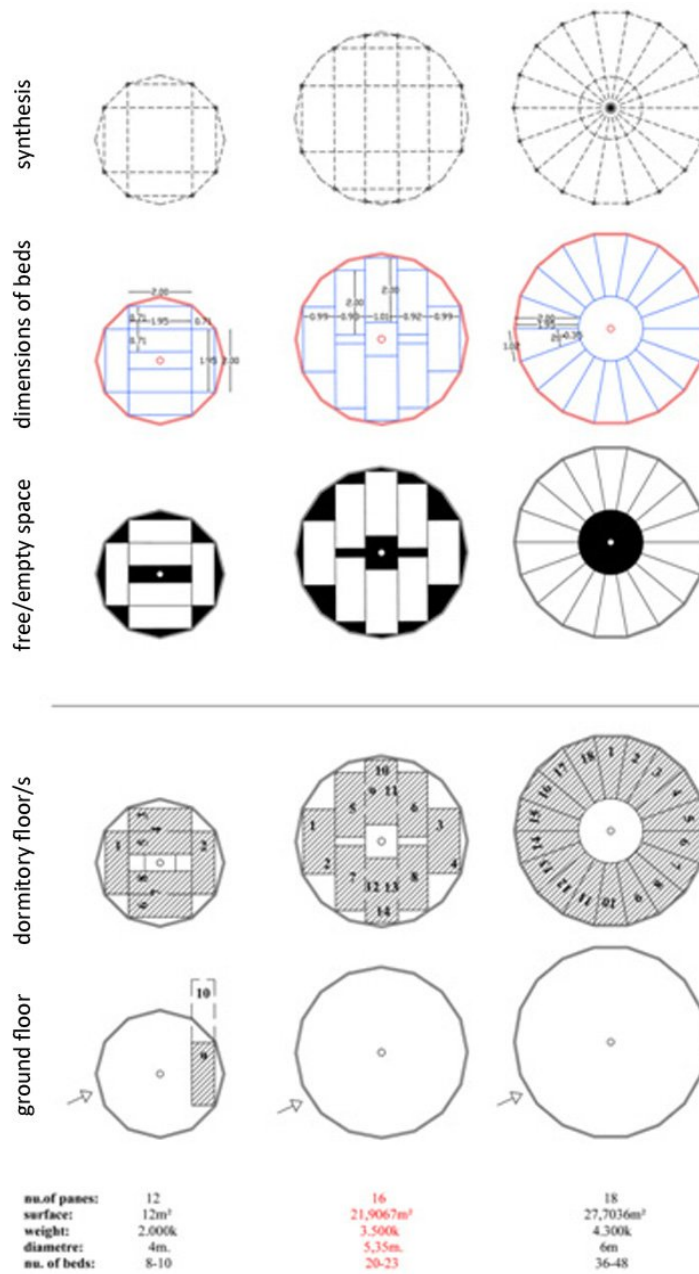
Working with Le Corbu, CH.P. got acquainted with the notion of the measure. However while she was producing this kind of dwellings, he hadn't even published yet the first version of "Le modulator". She had the chance to mature professionally in a environment that strived for the reinterpretation of the measures and proportions, trying to reset the standards of a "new living". What was "enough" in the past, was "too much" for today. She got accustomed to using specific elements as reference.

To produce small and flexible dwellings that first of all had to shelter, protect, and promote the relaxation and relish of nature, didn't live her many options but to choose the horizontal posture of the human body as her kind of measure. We note the relaxing posture of the man in one of her primary projects [Ima13]. Yet the matter of the human's body rest in a mountain area is something much more important as it seems. The climate of the mountain zones provoke extra tense and fatigue due to the lack of enough oxygen. Mountaineers tend to reach the mountain huts exhausted, after endless wandering in the mountainsides. Having a protected placeto lie down, in order to regain their body's temperature and strength, is of great importance. When we have to do with the typical kind of shelter, all the other functions of this constructions are put aside for favor of the body's and mind's replenishment. As a mountaineer herself, Ch.P. understood and respected the formalities of life in nature. Therefore she sought the beds as a principal kind of measure that, were to determine the size of her shelters.

Excluding her first project "*la maison au bord de l'eau*", all of her following attempts, began from the basic measure of the length of a bed, which gave it's proportions to the primary units. Accordingly these units were to be combined, amplified and multiplied in order to create bigger and



[Ima.77, produced by the author]



[Ima.78, produced by the author]

larger complexes. For the first time this was introduced graphically⁴⁹ in P.J.'s drawings for the amplified expansions of *"la maison de l'agriculture"* [Ima.77]. Later she followed the same strategy by proposing the two-meter beds as the sole measure for the *"cable shelter"* [Ima.28-31]. Once more she uses the same technique in a different kind of shelter; that of *"bivouac"*. As the evolving typology kept progressing, the more she seemed to identify the length of the bed as a critical element of the projects dimensions. The best investigation, yet unapplied concept, was that for the *"Tonneu shelter"* [Ima.78]. In the diagrams above we note her analytic method, towards the fundamental relation of the bed's length with the size of the whole construction. One should pay attention, in the third larger version, how she ends up proposing one covering panel for every bed. This proves that not only the size, but also the construction of the hut, has to follow the dictating form of the internal organization.

5. Conclusions

Ch.P.'s involvement with these projects was a revealing procedure to her, as far as architecture was concerned. Not only because the exercise on small prototypes introduced to her the basic rules of human's living in the minimum space, but also because made her strive for flexible, innovative and practical solutions, that gave her a new direction for her later works.

Her projects promote the elemental world, emphasizing on collective (several person in the same dormitory and single living area) and rationalized (complex cupboards, tables and storage space promoting the successive functions of the different units of the huts) living. Her work reflects the tendencies of her era towards economy, prosperity of the middle-class families. Through the study of minimum dwelling and her experience as a mountaineer she adopted new directions towards integration and sanitation.

Let us not forget the Weissenhof houses of Le Corbu, which were produced the time that Ch.P. was a beginner in his atelier. She must have been influenced by their experimental arrangement of the sleeping and living areas; the sitting rooms that converted to bedrooms, being not larger than a train's sleeping unit.

But it was not only Le Corbu that influenced her. It was a series of architects of her era that set the foundations of new ideas. Almost twenty years earlier in 1913, Adolf Loos's article in Opel⁵⁰, speaking about the rules for those, building in the mountains, which was published, must have served her in many ways, as it seems that she denied every conventional standards up until then.

⁴⁹ CH.P. had already described that her project *"la maison au bord de l'eau"*, could be easily dismantled and expanded, yet she hadn't been precise, presenting no graphic proof of this option.

⁵⁰ Adolf Loos, Opel, Die potemkin'sche Stadt: verschollene Schriften 1987-1993, G. Prachnercop, Vienna 1983. Translation: Jonathan Quinn.

"Do not built in a picturesque manner. Leave such effect to the walls, the mountains and the sun.....

.....Pay attention to the forms in which the locals build. For they are the fruits of wisdom gleaned from the past. But look for the origin of the forms. If technological advances made it possible to improve on the form, then always use this improvement.....

.....Be true! Nature only tolerates truth."

-Adolf Loos-

She denied total integration to the environment based on natural forms. On the contrary she presented rational shapes and combined forms that declared their artificial kind. She approached natural living, through the use of pure materials. Her "shelters" stand away from the ground having original forms. By experimenting and research she managed to go one step forward, as far as prefabricated construction was concerned, by presenting the advantages of new construction techniques for moderating climatic conditions.

Even more, she talked about easy assemblage, that could be executed by anyone. She accompanied her drawings with brief instructions and technical prescriptions, as in a form of a catalogue. As her examples evolve, the easier it is for everyone to erect it on his own.

Even though she was not thought to have been a trained architect, her methodology, revealed, a bright, solid theory of an experimental and free mind, enriched by the practical assurance of her experience. First she set her basic concepts⁵¹.

Starting from the minimum she went on composing the whole, keeping always in mind that the new social conditions demanded a modern man that would be practical and independent.

Her leisure-hut projects were not only simple, but also innovative. The later proof of many contemporary, mountain shelters include many of the ideas that she had posed. The notions of:

- an "extra terrestrial object" (spaceship) that stands away from the soil
- the use of high-tech materials in different combinations
- the study over the best internal comfort
- the dimensional expansion based on sleeping posts

are all, fundamental elements of the contemporary shelters, the reality of which confirm the diachronic universality of her proposals.

⁵¹ like the seven rules that she presented after the "bivouac shelter", which proved to have been her manifesto for the mountain huts' construction.

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